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THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME XVI

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1924

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā as in ale, fate.
ȧ " " senate, chaotic.
â " " glare, care, and as *e* in there.
ă " " am, at.
ä " " arm, father.
à " " ant, and final *a* in America, armada, etc.
a " " final, regal, pleasant.
a̲ " " all, fall.
ē " " eve.
ė̄ " " elate, evade.
ĕ " " end, pet.
ẽ " " fern, her, and as *i* in sir, etc.
e " " agency, judgment.
ī " " ice, quiet.
i̇̄ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ȱ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol.
oi " " oil, boil.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
u̇̄ " " unite.
ŭ " " cut, but.
u̲ " " full, put, or as *oo* in foot, book.
û " " urn, burn.
y " " yet, yield.
B " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g " " go, get.
G " " German Landtag = *ch* in Ger. ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw " *wh* in which.
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̲ " in sinker, longer.
ng " " sing, long.
N " " French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz''m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

A PARTIAL LIST OF THE LEADING ARTICLES IN VOLUME XVI

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* Deceased.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

MISSISSIPPI, mĭs'ĭ-sĭp'ĭ. One of the South Central States of the American Union. It takes its name from the river which forms its west boundary for a distance of about 300 miles and separates it from the States of Louisiana and Arkansas. It lies between Tennessee on the north and Louisiana on the south, being separated from the former by the thirty-fifth parallel of north latitude and from the latter by the thirty-first parallel from the Mississippi River to the Pearl River, a distance of 110 miles. Thence following the Pearl River southward the boundary line is completed on the south by the Gulf of Mexico. The Tennessee River cuts off a small portion from the northeast corner, but the east boundary separating the State from Alabama runs southward in a nearly straight line to the Gulf. Mississippi has an extreme length of 330 miles and an extreme width of 188 miles, and comprises an area of 46,665 square miles, of which 303 square miles is water. Mississippi includes, in addition to the mainland territory, the islands Ship, Horn, Cat, Petit Bois, and others, separated from the mainland by the Mississippi Sound.

Topography. The highest ridges in the northeast reach an altitude of about 700 feet. Throughout most of the State elevations range from 350 to 500 feet to about 150 feet a few miles from the Gulf. A moderate uplift of the region has allowed the rivers to carry the work of dissection to maturity, all gradients now being low, nearly or quite at base level. The streams have their lower courses in valleys opened wide, from a few hundred yards to several miles, and wandering in sinuous courses upon silted bottoms. These river bottoms cover a total of 7560 square miles, or over one-sixth of the entire State. Of this the Yazoo bottoms occupy the greater part. The flood plains of the Yazoo and Mississippi rivers are lined on the east by bluffs from 100 to 300 feet in height, caused by the lateral corrosion of the swinging meanders of the great river. These bluffs are capped throughout with a deposit of loess. Extending through the middle of the Yazoo bottoms is a flat ridge standing above flood level. This and the banks of the various streams are available for cultivation, being the best cotton land in the world. The bottom is being steadily reclaimed for plantations. The swamp and marsh area is occupied by cypress trees, very valuable as lumber, while the drier lands are covered with cane brakes and rich forests of many species of timber trees.

Hydrography. The principal rivers are the Mississippi, flowing the entire length, the Tombigbee, Big Black, and Pearl. The Yazoo River is a distributary of the Mississippi and the whole area of its bottom is a mesh of interlacing streams, bayous, and oxbow lakes. About one-half the area of the State drains directly into the Mississippi. The Pascagoula drains most of the southeastern quarter. The bottom lands of the Mississippi and other rivers are liable to overflow when the rivers are flooded. To guard against this, levees, or artificial banks, are built to restrain them. See LEVEE; MISSISSIPPI RIVER.

Flora. The result of the rather large annual rainfall and of the equable distribution through the year is best seen in the luxuriant forests, largely of deciduous trees. Over 125 species of forest trees are known. There are 15 species of oak, including the live oak. Cypress predominates on the bottom and swamp lands. The long-leaved pine is the chief forest tree of the southern half of the State. Tupelo, sycamore, persimmon, magnolia, holly, cucumber tree, sweet gum, black walnut, and various species of hickory, elm, and maple are also present.

Climate. Mississippi lies in the warm temperate climatic belt and its climate is strongly influenced by reason of its proximity to the Gulf. The average January temperature is 55° F. in the islands off the coast, 50° F. in the southern part of the mainland, and 40° F. near the north boundary. The average July temperatures range from 80° F. to 87° F. The average maximum shade temperature is 100°, while occasional anticyclones of winter bring a minimum temperature of 10° F. to the southern portion and zero weather to the portions below the northern quarter. Such cold weather is, however, very infrequent. The frost-free growing season lasts seven months in the north and ten months in the south. This is of the very greatest importance to many of the crops, especially cotton. The average annual rainfall for the whole State is over 50 inches. The southern quarter has over 60 inches, this distribution being largely due to the prevailing southwest winds and to the influence of the Gulf. The heaviest rains occur in late winter or early spring, when the warm Gulf winds meet the cold winds, but on the whole the precipitation is quite evenly dis

tributed through the year. There is a slight snowfall as far south as Natchez. The atmosphere is humid at all seasons, the average annual relative humidity being not far from 70 per cent in the northern half and from 70 to 75 per cent in the southern half. The average wind velocity for the whole year is seven miles per hour. The prevailing wind for January is north, while it is south for July. The cyclonic belt lies far to the north and generally does not touch the State.

Soils. The soils are pretty closely correlated with the geology. In the northeastern corner cherty and gravelly soils are common. The Selma Chalk or Rotten Limestone, the most extensive division of the Cretaceous, gives rise to a very fertile calcareous clayey soil, now mostly under cultivation. A narrow belt at the inland edge of the Tertiary formations, extending from the Tennessee line to the Alabama line, known as the post oak flatwoods, is characterized by stiff clay soils of very little agricultural value. In the eastern central part of the State reddish loams prevail. A little south of the centre there is another calcareous strip, formed by the Jackson and Vicksburg formations, and south of that sandy soils, rather poor, but easily tilled and responding generously to proper fertilization.

The brown loam and loess in the western half of the State, extending from about Holly Springs, Jackson, and Brookhaven to the river bluffs, make a very fertile soil, and the alluvium of the delta is one of the richest soils in the world. Much of the last is as yet too swampy for cultivation, but it is being gradually drained by levees and ditches. The loess is very easily eroded, and large areas of it have been so cut up by gullies since the country was first settled as to make the land almost worthless.

Geology. The Cumberland Ridge just reaches the northeast corner of the State with its outlying undulations, thus bringing a small outcrop of Devonian and Subcarboniferous rocks into its borders. From this corner as a focus the younger strata dip away gently to the west and south. Cretaceous beds cover a belt radiating about 25 miles west and 75 miles south of the northeast corner. The four prominent members of the Cretaceous outcrop, in series from the oldest up, are the Tuscaloosa, Eutaw, Selma Chalk, and Ripley. The total thickness of these beds is 2000 feet. At the close of Cretaceous time there was a deep gulf extending north to Cairo, Ill., which was slowly filled by fluvial and offshore deposits. These beds are the Eocene and Neocene outcrops, covering the greater part of the State and extending from the Cretaceous on the northeast to the Yazoo bottoms and almost to the Gulf on the south.

Mineral Products. The only activities of Mississippi as a mineral-producing State are the output of clay, sand, and gravel, and the production of mineral waters. Some iron ore and sand-lime brick have been worked, but are of no importance. The clay products in 1913 were valued at $691,271. In the same year there were produced 1,891,663 short tons of sand and gravel, valued at $430,401. The production of commercial mineral waters in 1913 was 346,652 gallons, valued at $81,800. The total value of the mineral production in 1913 was $1,143,472.

Agriculture. Mississippi is preëminently an agricultural State. Of the approximate land area of 29,671,680 acres, in 1910 there were 18,557,533 acres in farms, of which there numbered 274,382. Improved land in farms included 9,008,310 acres. The average number of acres per farm was 67.6 in 1910. The total value of farm property, including land, buildings, implements, machinery, domestic animals, and poultry, was, in 1910, $426,314,634. There were, in 1910, 274,382 farm operators, of whom 92,891 were owners, 825 managers, and 181,491 tenants. The share of the farms operated by tenants increased from 43.8 per cent in 1880 to 66.1 per cent in 1910. The land in farms owned and operated by white farmers in 1910 was 12,100,106 acres, with 4,520,927 acres improved land, and by negroes 6,457,427 acres, with 4,487,383 acres improved. Acreage operated by white owners was 9,489,280 and by negro owners 21,227,194. The average acreage per farm operated by white farmers was 110.4 in 1910 and for negroes 39.2. More than three-fourths of all the farms were between 10 and 99 acres in size. The native white farmers in 1910 numbered 108,909 and foreign-born white farmers numbered 736. Negro and other nonwhite farmers numbered 164,737, or 60 per cent of the total number. The acreage, production, and value of crops shown in the following table are estimates for 1914 made by the United States Department of Agriculture.

PRODUCTS	Acreage	Prod. bu.	Value
Corn	3,150,000	58,275,000	$42,541,000
Oats	160,000	3,680,000	2,392,000
Potatoes	12,000	960,000	912,000
Sweet potatoes	50,000	4,500,000	2,835,000
Hay	210,000	*304,000	3,648,000
Rice	1,000,000	30,000	26,000
Cotton	3,120,000	†1,275,000	41,512,000

* Tons. † Bales.

The total value of crops in 1909 was $147,316,000 and the acreage 6,158,719. The leading crops in the order of their importance are cotton, corn, cottonseed, hay and forage, and sweet potatoes and yams. The acreage of cotton in 1909 was 3,400,210. The production was 1,127,156 bales, valued at $83,148,805. The chief acreage of cotton is found in that section described as the Yazoo delta or bottoms. In acreage of cotton Mississippi ranked fourth in 1914, being surpassed only by Texas, Georgia, and Alabama.

Corn is the leading cereal produced; its acreage in 1909 was 2,172,612. The production was 28,428,667 bushels, valued at $26,030,376. Of the remaining cereals only oats are important. In 1909, 97,085 acres were harvested, producing 1,268,675 bushels, valued at $822,932. The acreage of hay and forage in 1909 was 229,705, producing 279,236 tons, valued at $3,363,647. The growing of peanuts is given considerable attention. The total acreage in 1909 was 13,997, and the production amounted to 284,791 bushels, valued at $317,236. A small quantity of tobacco is grown, and this in 1909 amounted to 18,600 pounds, valued at $3390. The total acreage of potatoes and other vegetables in 1909 was 125,610, and their value $9,483,576. Excluding potatoes and sweet potatoes and yams, the acreage of vegetables was 61,223, and their value $5,868,000. There were grown, in 1909, 1,634,305 bushels of orchard fruits, valued at $1,325,506. Of these the most important in quantity and value were peaches. Second in product and value were apples; third, plums and prunes. There were also grown, in

1909, 760,563 pounds of grapes, valued at $44,262. Of the small fruits grown the most important is the strawberry, of which 1,345,013 quarts, valued at $101,882, were produced. Among tropical fruits, figs, oranges, and pomeloes are grown. The production in 1909 was 1,949,301 pounds, valued at $107,609. Mississippi is one of the most important sugar-cane-producing States. There were grown, in 1909, 222,600 tons, from which were made 1665 pounds of sugar and 2,920,519 gallons of sirup, the latter valued at $1,494,696.

Live Stock and Dairy Products. The total number of cattle of all kinds in 1910 was 1,012,632, with a value of $15,269,264. On Jan. 1, 1915, the estimated number of cattle other than milch cows was 514,000, with a value of $7,350,000; milch cows, 434,000, valued at $15,190,000; horses, 241,000, valued at $20,726,000; mules, 292,000, valued at $31,536,000; sheep, 208,000, valued at $458,000; swine, 1,540,000, valued at $11,088,000. The total value of the milk, cream, and butter fat sold and butter and cheese made in 1909 was $6,003,465. The milk produced amounted to 79,079,293 gallons, the butter made to 28,730,685 pounds, valued at $5,571,011. Fowls of all kinds in 1909 numbered 5,070,000, valued at $1,846,750. The production of eggs was 17,700,000 dozen, valued at $3,151,000.

Fisheries. Biloxi is the centre of the wholesale fishing industry. It is the shipping point of large quantities of canned and prepared oysters and shrimps. Mollusks and crustaceans are the principal products of the fisheries, of which oysters are by far the most important. In the year 1908 the valuation of the fish caught was $295,000. Buffalo fish, sea trout, white mullet, catfish, and paddlefish are, in the order named, the principal species. In that year there were 2037 persons engaged in fisheries, and the capital invested was $522,000. The total production was valued at $556,000. The industry seems to be declining in the number of persons engaged and the value of products. This is probably due to a decision of the United States Supreme Court transferring the jurisdiction of the Pear Island oyster and fishing grounds to Louisiana. The chief fishing grounds are the Gulf of Mexico and the Mississippi River.

Forest Products. In 1908, 17,500,000 acres, about 59 per cent of the total area, were covered by forests. As noted in the section on *Manufactures*, the lumber industry is the most important single manufacturing industry in the State. In the production of rough lumber, 2,610,581 M feet B. M., Mississippi ranked third among the States. By far the greatest percentage of the cut was yellow pine. The other principal varieties sawed, in the order of their importance, were oak, gum, cottonwood, cypress, poplar, hickory, ash, tupelo, and elm. There were manufactured, in 1909, 151,303 thousands of shingles and 90,926 thousands of lath. In the same year there were produced 1,589,000 gallons of turpentine valued at $732,000, and 27,020 tons of resin valued at $740,000. There were, in 1913, 908 active saw mills. The lumber produced in 1914 was valued at $42,793,000. In addition to the figures of lumber given above, there were taken from the farms in 1909 forest products valued at $6,602,943.

Manufactures. While Mississippi is not essentially a manufacturing State, its industrial importance has kept pace with its growth. In 1909 the gross value of products per capita was $45. The table on page 4 gives the most important figures relative to manufactures for 1909 and 1904. The most important single industry is that connected with lumber and timber products. This is treated in detail under *Forest Products*. The manufacture of cottonseed oil and cake ranks second in value of products. In 1909, 559,357 tons of cottonseed were crushed, and from it were manufactured 24,386,289 gallons of cottonseed oil, 244,738 tons of meal and cake, 181,797 tons of hulls, and 24,237,536 pounds of linters. Mississippi has shared in the remarkable development of cotton manufactures in the Southern States. The manufacture of cotton goods ranks fourth. The principal material used in these manufactures is domestic cotton, of which there were consumed, in 1909, 16,371,192 pounds. The principal product is bleached and unbleached sheetings and shirtings, the output of which amounted to 17,225,461 square yards in 1909. The number of producing spindles was 153,804 in 1909, and the number of looms, 4733. The manufacture of fertilizers is an important industry and ranks fifth. There were made, in 1909, 59,902 tons of superphosphates from minerals, bones, etc., 78,193 tons of complete fertilizers, and 1006 tons of other fertilizers. In addition to these a considerable quantity of fertilizers was produced by cottonseed-oil mills. In the production of turpentine and rosin Mississippi is one of the most important States, although this industry has shown a decline in recent years. Mississippi in 1909 ranked fourth among the States in the output of these products.

The total number of wage earners in 1909 was 50,384, and of these 47,898 were males. The wage earners of 16 years of age and under numbered 1058, of whom 611 were males. The prevailing hours of labor for nearly half the wage earners employed were 60 a week.

The State has five cities having a population of over 10,000—Hattiesburg, Jackson, Meridian, Natchez, and Vicksburg. These cities contained in 1910 only 4.9 per cent of the total population and produced 14.8 per cent of the total value of its manufactures. The most important manufacturing city is Meridian (q.v.), in which there were, in 1909, 1524 wage earners and which had a product valued at $4,237,476. The cottonseed-oil industry is the most important, followed by the manufacture of fertilizers, steam-railroad repair shops, and lumber mills.

Transportation. Mississippi has excellent transportation facilities. It has direct connection with several large railroad systems of the South and Middle West and is bordered for practically its entire length by the Mississippi River. The proximity to the port of New Orleans by means of this river places it in a favorable position for domestic or foreign shipments. The total railway mileage on Oct. 30, 1913, was 4279. The principal railroads with their main-line mileage in 1913 were as follows: Illinois Central, 679; Yazoo and Mississippi Valley, 1144; Mobile and Ohio, 315; New Orleans, Mobile, and Chicago, 370; Southern Railway, 236; Mississippi Central, 164. The mileage of electric railways on Jan. 1, 1913, was 107. There were 12 companies operating such railways in that year. Pearl River is a customs district and has a small foreign trade.

Banking. The Bank of Mississippi at Natchez was chartered in 1809. In 1818 it was created a State bank, with a capital of $3,000,-

000, the State participating in its management and pledging a monopoly of its banking business until 1840. In 1830, with the hope of getting more direct control of banking operations, the Legislature broke its pledge by establishing the Planters' Bank of Mississippi, with a capital of $3,000,000, and making it the financial agent of the State. This forced the first bank into liquidation. For a few years the Planters' Bank had a practical monopoly of the banking, but from 1835 new banks followed in rapid succession. The most daring venture was the organization of the Mississippi Union Bank in 1838, with a capital of $15,500,000, which made it the largest State bank in the United States at that time. These bold undertakings in the very midst of a financial crisis could lead to only one result. In 1841 the repudiation of the charter granted to the Union Bank was the chief political issue in the State. The repudiators won, and the bonds were canceled in 1842. In 1853 the Planters' Bank bonds were also canceled. These acts were upheld by the constitution of 1890. There were numerous failures in 1838–45; in 1855 there was but one chartered bank. A revival came in the eighties, when national banks were introduced. Stringent banking laws have given to the State banks the confidence of the people, and their number has increased. On Sept. 12, 1914, there were 38 national banks with a combined capital of $3,835,000; surplus, $1,777,456; cash, etc., $391,649; loans, $14,897,834; and deposits, $16,037,548. On June 30, 1914, there were 266 State banks with a total capital of $8,604,330; surplus, $2,003,081; cash, etc., $1,787,074; loans, $33,453,505; and deposits, $34,416,264. There were 22 loan and trust companies with an aggregate capital of $1,803,150, and 17 savings banks with a combined capital of $485,600.

Government. The present constitution was adopted in 1890, and it is the fourth instrument under which the State has been governed. The constitution of 1890 had for its special purpose the preservation of the supremacy of the white vote. (See *Suffrage and Elections* below.) The constitution may be amended by a two-thirds vote of both Houses indorsed by the vote of the people.

Executive.—The chief executive officer is the Governor, who holds office for four years and is not eligible for immediate reëlection. Other executive officers are: Lieutenant Governor, Secretary of State, Treasurer, Auditor, Attorney-General. The Treasurer and Auditor may not be candidates for two successive terms.

Legislative.—The Legislature includes the Senate and the House of Representatives. In 1912 the system of sessions once in four years, with a special session between, was changed to biennial sessions in even years. The Lower House includes (1915) 138 members and the Senate 45.

Judiciary.—The judiciary is the supreme or appellate court of the State, which, by constitutional amendment adopted in 1914, consists of six members; a chancery court of equity jurisdiction and a circuit court of common-law jurisdiction in each county. The chancery and circuit judges have heretofore been appointed by the Governor, but are now elective. The coun-

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — TEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	Persons engaged in industry: Total	Persons engaged in industry: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries	1909	2,598	56,761	50,384	$72,393	$18,768	$80,555	$43,629
	1904	1,520	42,966	38,690	50,256	14,819	57,451	31,650
Bread and other bakery products	1909	79	417	285	287	128	878	362
	1904	57	237	160	184	69	499	238
Cars and general shop construction and repairs by steam-railroad companies.	1909	10	2,709	2,572	1,412	1,558	3,233	1,811
	1904	15	2,755	2,653	1,337	1,421	2,886	1,554
Cotton goods, including cotton small wares	1909	14	2,720	2,645	5,336	695	3,102	1,060
	1904	14	2,225	2,161	4,520	518	2,463	814
Fertilizers	1909	10	524	449	2,607	141	2,125	740
	1904	5	371	348	1,049	79	1,082	225
Foundry and machine-shop products	1909	50	711	583	1,682	295	1,088	616
	1904	35	622	516	875	260	920	564
Ice, manufactured	1909	51	477	341	1,851	189	866	653
	1904	37	376	274	1,266	119	603	458
Lumber and timber products	1909	1,647	37,118	33,397	39,455	12,583	42,793	28,586
	1904	664	24,415	22,431	24,819	9,242	26,162	19,157
Oil, cottonseed, and cake	1909	87	3,014	2,503	10,133	833	15,966	3,797
	1904	91	2,956	2,499	8,552	732	12,587	2,517
Printing and publishing	1909	225	1,132	736	1,173	387	1,308	1,008
	1904	211	861	549	733	254	916	721
Turpentine and rosin	1909	64	2,811	2,573	1,251	582	1,475	1,126
	1904	124	3,036	2,633	598	737	2,366	1,972

MISSISSIPPI
SCALE OF STATUTE MILES
0 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 40 60 80 100
County Towns
Railroads
A 92° B C 91° D E 90° F G 89° H J 88° K
TENNESSEE
ARKANSAS
LOUISIANA
ALABAMA
Mississippi R.
Tennessee R.
Big Bear Cr.
Big Black R.
Arkansas R.
Yazoo R.
Bayou Macon
Bayou Bartholomew
Boeuf R.
Coldwater R.
Tallahatchie R.
Yalobusha R.
Pearl R.
Pascagoula R.
Tombigbee R.
Tuscumbia R.
Bear Cr.
DE SOTO
MARSHALL
BENTON
TIPPAH
ALCORN
TISHOMINGO
TUNICA
TATE
PRENTISS
UNION
PANOLA
LAFAYETTE
LEE
COAHOMA
QUITMAN
PONTOTOC
TALLAHATCHIE
YALOBUSHA
CALHOUN
CHICKASAW
MONROE
BOLIVAR
GRENADA
CLAY
LEFLORE
WEBSTER
CARROLL
MONTGOMERY
OKTIBBEHA
LOWNDES
CHOCTAW
WASHINGTON
HUMPHREYS
HOLMES
ATTALA
WINSTON
NOXUBEE
SHARKEY
YAZOO
LEAKE
Hernando
Holly Springs
Senatobia
Sardis
Oxford
New Albany
Pontotoc
Tupelo
Water Valley
Okolona
Amory
Aberdeen
Columbus
West Point
Starkville
Greenville
Greenwood
Winona
Lexington
Durant
Kosciusko
Yazoo City
Clarksdale
Cleveland
Rosedale
Benoit
Shaw
Pace
Indianola
Belzoni
Hollandale
Leland
Hamburg
Arcola
Stoneville
Metcalfe
Wayside
Swiftwater
Trilake
Chatham
Lake Providence
Mayersville
Rolling Fork
Eagle Lake
Vicksburg
Warren
Montezello
Star City
Pinebluff
De Witt
Varner
Bastrop
Tallulah
Delta
Friar Point
Coahoma
Jonestown
Clover Hill
Farrell
Lula
Tutwiler
Sledge
Crenshaw
Pleasant Grove
Batesville
Courtland
Eureka Springs
Pope
Sarepta
Paris
Gault
Tula
Taylor
Randolph
Plymouth
Water Valley
Oakland
Yalobusha
Harrison
Enid
Patterson
Charleston
Tillatoba
Coffeeville
Air Mount
Calhoun City
Derma
Pittsburg
Houston
Okolona
Chickasaw
Monroe
Aberdeen
Amory
Hamilton
Smithville
Nettleton
Shannon
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Matthews
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Matthews
Bishop
Gerbshun
Troy

Vicksburg
Meridian
Natchez
Hattiesburg
Laurel
Ellisville
Brookhaven
McComb
Columbia
Gloster
Woodville
Port Gibson
Crystal Springs
Hazlehurst
Wesson
Magnolia
Liberty
Centerville
Franklinton
Greensburg
Clinton
Newroads
St. Francisville
Amite
Springville
Covington
Bay St. Louis
Pass Christian
Gulfport
Biloxi
Ocean Spgs
Pascagoula
Moss Point
Lake Maurepas
Lake Pontchartrain
Mississippi Sound
GULF OF MEXICO
Mobile Bay
Mississippi
Louisiana
Alabama
Tangipahoa R.
Amite R.
Pearl R.
Bogue Chitto R.
Chickasawhay R.
Escatawpa R.
Tombigbee R.
Red R.
Homochitto R.
Buckatunna Cr.
Chickasaw Cr.
Hurricane Cr.
Catahoula Lake
Lake Bruin
Tensas R.
Boeuf R.
Bayou Macon
Big Black R.
Yazoo R.
Tallulah
Rayville
Winnsboro
Columbia
Harrisonburg
Jonesville
Tallulah
Oak Ridge
Redwood
Signa
Bovina
Edwards
Raymond
Learned
Utica
Terry
Crystal Springs
Hazlehurst
Port Gibson
Rocky Spgs
Ingleside
Grand Gulf
Carpenter
Myles
Willing
Gallman
Mizpah
Martin
Tillman
Barlow
Glancy
Rodney
Lorman
Jacobs
Red Lick
Violet
Brandywine
McBride
Bearegard
Homochitto
Caseyville
Redstar
Montgomery
Sontag
Wesson
Grange
Mt. Olive
Arbo
Mize
Magee
Pinola
Westville
Fairdale
Shiver
Bush
Martinsville
Ashley
Mechebert
Gwinville
Whitecapp
Prentiss
Williamsburg
Carson
Bourgman
Oakvale
Bassfield
Melba
Sumrall
Maybello
Collins
Ora
Covington
Lawrence
Jefferson
Davis
Brookhaven
Monticello
Mt. Carmel
Mt. Zion
Hartman
Bogue Chitto
Mackenzie
Topeka
Verna
Jayess
Prosperity
Saintsville
Union
Bridges
Holmesville
Kokomo
Chinnaville
Dinan
Hathorn
Wilkesburg
Sunrise
Improve
Clyde
Petal
Richburg
Palmer
Augusta
Purvis
Baxterville
Rawls Spgs
Morriston
Gulf
Richton
Moselle
Blackburn
Seminary
Sanford
Gandel
Crottsville
Ovett
Bloodgett
Loper
Henderson
Battle
State Line
Chloora
Clara
Grafton
Byrd
Avera
Adamsville
Janet
Jonathon
Leakesville
McLain
Moboba
Rawsonville
Agnes
Brooklyn
Elder
Janice
Lumberton
Carnes
Maxie
Barbara
Merrill
Eubank
Lucedale
Evanston
Stipman
Tatum
Howell
Bendale
Wiggins
Mentorum
Inda
Ruble
Perkinston
Beatrice
Vestry
Daisy
Harleston
Bonnie
Wade
Three Rivers
Bigpoint
Vancleave
Hurley
Large
Florala
Ramsay
Saucier
Airey
Worthan
Wool
Market
Lorraine
Hanleton
Fenton
De Lisle
Kiln
Gaines
Logtown
Bordeaux
Ansley
Pearlington
Lakeshore
Waveland
Bayou Caddy
Long Beach
Gulfport
Biloxi
Ocean Springs
Pascagoula
Moss Point
Grants Pass
Dauphine I.
Petit Bois I.
Horn I.
Ship I.
Cat I.
Isle Au Pitre
Mobile Pt.
Mobile
Meehan Jct.
Whynot
Celle
Enterprise
Stonewall
Quitman
Cremichael
Barnett
De Soto
Langsdale
Horne
Butler
Basle
Energy
Garlandville
Montrose
Pineville
Gridley
Rose Hill
Louin
Paulding
Pachuta
Hainlet
Bay Springs
Heidelberg
Moss
Hoy
Sandersville
Lucutta
Gilmanville
Mathiville
Waynesboro
Boyce
Lightsey
Whistler
Winchester
Buckatunna
St. Stephens
Shubuta
Vosburg
Quitman
Enterprise
Stonewall
Meridian
Marion
Russell
Bonita
Toomsuba
Lauderdale
Bailey
Larkhart
Daleville
Livingston
Decatur
Chunky
Newton
Hickory
Lawrence
Forest
Lake
Morton
Norris
Gilbert
Roberts
Lorena
Klein
Burns
Virgil
Daniel
Dobson
Puckett
Star
Comeby
Cato
Raleigh
Sylvarena
Pinelawn
Overley
Pinkneyville
Ruth
Ingomar
Ingrene
Hickory
Chunky
Newton
Decatur
Chisholm
Collinsville
Daleville
Lauderdale
Marion
Meridian
Jct.
Whynot
Celle
Hurricane Cr.
Enterprise
Stonewall
Clarke
Quitman

ties are divided into chancery and circuit districts, a chancellor and a circuit judge being chosen for each district. There are in addition two or more justices of the peace elected for each of five districts in a county.

Suffrage and Elections.—Every male citizen 21 years of age who has resided in the State for two years, in the district in which he offers to vote for one year, who has registered and paid taxes for two preceding years, and who is able to read or understand the Constitution of the United States, is eligible to vote. The last qualification, which election officers are given discretion to interpret, was designed chiefly to eliminate a large portion of the negro vote. All voters must pay a poll tax of $2 for the support of the common schools.

All nominations for the State, district, and county officers and United States Senators are made at primary elections. Each political party pays the expenses of its primaries, and the candidates may be assessed for expenses. General elections are held on the first Tuesday after the first Monday of November.

Local and Municipal Government.—Cities may adopt a commission form of government including the charter providing for the recall and initiative at an election held on petition by 10 per cent of the voters. Any city may vote to abandon its charter after six years under commission government. Each county is divided into five districts, in each of which a resident freeholder is selected as a member of the board of supervisors. The boards of supervisors regulate the fiscal affairs of the county, make all contracts, equalize assessments, levy the taxes, and have exclusive control of roads, ferries and bridges, etc.

Miscellaneous Constitutional and Statutory Provisions.—Women are placed on an equality with their husbands in acquiring and disposing of property and the making of contracts. A divorce may be granted only to one who has lived for one year at least in the State. A public-service corporation which may remove a suit from a State to a Federal court forfeits its right to carry on intrastate commerce in the State. Nine or more jurors may agree on a verdict in civil suits. Contributory negligence does not bar recovery for injuries or death. The giving of tips in hotels is forbidden. As a result of a statute passed in 1908, the State is under prohibition. The Legislature of 1914 passed a measure restricting the intrastate shipment of intoxicating liquors and prohibiting the keeping of liquor in any locker of any social club or any other organization. There are strict regulations for railroad companies delivering intoxicating liquors shipped from outside the State.

Finance. The early financial history of the State is closely connected with the organization of its banks. A large State debt of $2,000,000 was created in 1830 in order to acquire shares in the Planters' Bank and, in 1838, $5,000,000 for shares of the Union Bank of Mississippi. These banks were later brought to insolvency as a result of the financial crisis of the thirties. This involved the State in an enormous debt. In the floating of this debt infringements were made upon the constitution, and it was repudiated by a popular vote in 1852. The debt was finally disposed of by a clause in the constitution of 1875. The State was again involved in serious financial difficulties during and after the Civil War. The "carpet-bag" régime greatly aggravated the situation. The expenditures increased from about $500,000 in 1867–69 to more than $1,500,000 in 1871–75, and the tax rate increased from 1 mill to 14 mills. The taxpayers organized a protest in 1874, and a gradual decrease of the State's debt, expenditures, and rate of taxation followed. The total debt in 1880 was $3,324,084, of which $530,615 was bonded debt. On Sept. 30, 1912, the total debt was $4,460,519, of which $1,506,899 was bonded debt. The funded debt consisted on that date of several series of bonds and of special debt obligations to public trust funds. The latter represent obligations to several educational funds the principal of which, amounting to $2,344,674, has been used by the State, for which it pays an annual interest of 6 per cent in perpetuity. The bonded debt on Sept. 30, 1913, was $3,923,752. The per capita debt in 1912 was $2.41. There is no sinking fund. The total receipts from all sources for the fiscal year 1913 amounted to $4,501,447 and the disbursements to $4,426,591. The balance at the beginning of the fiscal year was $250,999 and at the end $325,855. The chief sources of revenue are State taxes, and the chief expenditures are for educational and State institutions.

Militia. The males of militia age in the State in 1910 numbered 345,745. The organized militia consists of one brigade of infantry, comprising the second and third regiments, and a sanitary troop and a field hospital. The total strength of enlisted men in 1914 was 1116 and of officers 104.

Population. The following figures show the growth of the population at various periods: 1800, 8850; 1830, 136,621; 1850, 606,527; 1860, 791,305; 1870, 827,922; 1880, 1,131,597; 1890, 1,289,600; 1900, 1,551,270; 1910, 1,797,114. The est. pop. on July 1, 1914, was 1,901,882; 1920, 1,790,618. In 1910 Mississippi ranked twenty-first among the States. There is a very small foreign-born population, but it has a larger percentage of colored population than any other State. The white population in 1910 was 786,111, and the negro population was 1,009,487. The white population, however, is increasing at a faster rate than the negro. The foreign-born whites in 1910 numbered 9389. The urban (cities of 2500 or more) population is comparatively small. In 1910 this amounted to 207,311. The rural population in 1910 was 1,589,803. The negroes are most numerous in the western or Mississippi valley counties, in some of which they are five times as numerous as the whites. There are about 1250 Indians, who are descendants of the Choctaw tribes which inhabited the State at the time of its settlement. A large number of these Indians have removed to Oklahoma and have become members of the Choctaw nation. In the State in 1910 there were 905,760 males and 891,354 females. The males of voting age numbered 426,953. There were in 1910 only nine cities having a population of 8000 or over. The largest city, Meridian, had a population in 1910 of 23,285 and, in 1914, 21,806 (estimate). The other large cities with their populations in 1910 and as estimated for 1914 are as follows: Jackson, 21,262 and 26,990; Vicksburg, 20,814 and 22,090; Hattiesburg, 11,733 and 14,952; Greenville, 9610 and 10,448; Columbus, 8988 and 10,053; Biloxi, 8049 and 9147; Natchez, 11,791.

Education. Education in Mississippi is car-

ried on under some disadvantages, caused by the large and widely scattered rural population. This fact and a negro population that amounts to more than half of that of the State accounts for the large percentage of illiteracy. The total illiterates in 1910 numbered 290,235 (persons of 10 years and over), a percentage of 22.4. South Carolina and Alabama were the only States with higher percentages. Of the total illiterates the native whites numbered 28,344, or 5.3 per cent, and the negroes 259,438, or 35.6 per cent. Conditions, however, are greatly improving, and the percentage of illiterates is steadily decreasing. In 1910 the total school population was 644,805, of which 265,767 were native whites of native parentage and 372,331 were negro.

According to an enumeration made in 1912 the total number of children of school age in that year was 740,856; of these 311,389 were native white and 429,467 were negro. In addition there were 407 Indian children of school age. There is no compulsory-education law.

The administration of the schools is in the hands of the State Board of Education, composed of the Secretary of State, the Attorney-General, and the Superintendent of Education. The latter is the chief executive officer. There is a superintendent for each county, and there are separate districts for white and for negro children. The districts have the power to tax themselves for the support of the schools. The common-school fund amounts to about $3,500,000. For a long time the legislatures were somewhat indifferent to the importance of improvement in educational matters, but beginning with 1910 several laws of great importance have been passed. These included a measure permitting the consolidation of two or more weak schools into one stronger school; the establishment of agricultural high schools; the creation of a textbook commission and of a supervisor of elementary rural schools. The Legislature of 1911–12 enacted several important measures which have had good results.

There is a normal school at Hattiesburg, established in 1911. The Shelby Normal Institute at Shelby is for colored students. The institutions of collegiate rank include the University of Mississippi at University, the Mississippi Agricultural and Mechanical College at Agricultural College, Mississippi College at Clinton, Millsaps College and Meridian Male College at Meridian. Colleges for women are Hillman College at Clinton, Mississippi Industrial Institute and College at Columbus, Grenada College at Grenada, Meridian Women's College at Meridian, and the Port Gibson Female College at Port Gibson. Rust University at Holly Springs is for colored students. Other colleges for colored students are the Alcorn Agricultural and Mechanical College at Alcorn, the Southern Christian Institute at Edward, the Mississippi Industrial College at Holly Springs, Campbell College at Jackson, Jackson College at Jackson, Kosciusko Industrial College at Kosciusko, Lincoln School at Meridian, Tougaloo University at Tougaloo, Utica Normal Industrial Institute at Utica, Vicksburg Industrial School at Vicksburg, and Granada-Scion College at Winona. There are also several normal schools for colored persons.

Charities and Corrections. The charitable and correction institutions under the control of the State include the State Charity Hospital at Jackson, the State Charitable Hospital at Vicksburg, the State Charitable Hospital at Natchez, the Beauvoir Home at Beauvoir, the State Insane Asylum at Asylum, the Eastern Mississippi Insane Asylum at Meridian, the State Penitentiary at Jackson, the Deaf and Dumb Institution and the Institution for the Blind at Jackson. State convicts are employed on several State farms and plantations, white and negro convicts being assigned to different farms. These farm penitentiaries are controlled by a board of trustees elected by the people. The hiring out of prisoners by counties is prohibited. Public farms must be secured for them to work on by the county authorities or they must be employed on the public roads.

Religion. Over half of the Church population of the State belong to the Baptist church, and the majority of the remainder to the Methodist. Of the lesser denominations the more important are the Presbyterian, Roman Catholic, Christian, and Protestant Episcopal.

History. In 1539 Hernando de Soto, with a band of Spanish adventurers, crossed the northeastern part of what is now the State and in the early part of 1541 reached the Mississippi River, near the present site of Memphis, Tenn. In 1673 the French explorers Joliet and Marquette, passing down the Mississippi, sailed as far as the mouth of the Arkansas. In 1681–82 La Salle sailed down the river to its mouth and, taking formal possession for the King of France, Louis XIV, named the country Louisiana after him. The first attempt to found a colony was made in 1699 by Iberville, who brought 200 immigrants from France to Biloxi, on the east shore of the Bay of Biloxi. This was the germ of the subsequent settlement of New Orleans (1718). In 1716 Iberville and Bienville, with a large body of immigrants and a military force, ascended the Mississippi to the present site of Natchez, where they founded a settlement named Rosalie, in honor of the Countess of Pontchartrain. Attempts to plant colonies were soon after made at St. Peter's (on the Yazoo), at Pascagoula, and elsewhere. The small colonies in Mississippi, however, grew but slowly, New Orleans attracting many of the settlers. Under Bienville, who was Governor of Louisiana from 1718 to 1724, friendly relations with the Indians were preserved; but under his successor, Perriez, the hostility of the Natchez Indians was awakened. In 1729 a sudden assault was made on the line of French posts. At Fort Rosalie 200 persons were killed and more than 500 were taken prisoners. In the smaller settlements many of the inhabitants were butchered. Retribution followed swiftly. Aided by the Choctaw tribes, the French succeeded in defeating the Natchez, the greater part of whom fell in battle, while most of the survivors were sold as slaves. When Bienville became Governor again, in 1733, he found the colony at war with the Chickasaws, allies of the English, and the conflict continued for several years. There was a peace, followed in 1752 by another Indian war, instigated, it was said, by English adventurers. The French commander sought to retaliate, but without much success. Under French rule the country failed to prosper. In 1763 France ceded its possessions east of the Mississippi to Great Britain, which received also Florida from Spain. Immigrants flocked thither in considerable numbers from the English colonies on the Atlantic coast as well as from Scotland.

That part of the territory south of a line drawn through the mouth of the Yazoo River eastward to the Chattahoochee had been erected into the Province of West Florida soon after the establishment of English rule in 1763. In 1781 West Florida was conquered by Spain and passed under Spanish rule. By the Peace of Paris, in 1783, the thirty-first parallel of latitude was recognized as the southern boundary of the United States, and Spain was therefore considered as an intruder in that part of Mississippi to the north of the line. By the Treaty of 1795 between the United States and Spain, Spain ceded her claims to the disputed territory, but continued to occupy it until 1798. In 1798 the Territory of Mississippi was organized, and in 1804 it was extended to the present boundary of Tennessee. In 1813 the district south of 31° and east of the Pearl River, taken from Spain, was annexed. At first a Governor and three judges appointed by the President were the chief authorities for the government of the Territory, but in 1800 provision was made for a legislature, the Lower House consisting of nine members representing the three counties into which the Territory was then divided. In 1802 Washington became the capital of the Territory. In the Creek War Mississippi took a conspicuous part, several hundred inhabitants of the Territory being massacred at Fort Mims (q.v.). In the War of 1812 the Territory was well represented at the battle of New Orleans. In March, 1817, Congress passed an enabling Act for the admission of Mississippi to the Union, and the State was formally admitted Dec. 10, 1817. The most notable features of the first constitution of Mississippi were the high property qualifications for holding office, the short tenures of offices, and the large appointing power of the Governor and Legislature. The first Governor was David Holmes, and during his administration the capital was permanently located at Jackson, near the headwaters of the Pearl River.

By the treaties of 1830 and 1832, with the Choctaw and Chickasaw Indians, who inhabited all the northern part of the State, the lands occupied by those tribes were incorporated into the State, subjected to its jurisdiction, and thrown open to settlement by the whites. In 1832 a new constitution was adopted for the State. Its most notable features were the abolition of property qualifications for officeholding, the requirement that all officers, both State and county, including the judges, should be chosen by the people. It also created a high court of errors and appeals and abolished the office of Lieutenant Governor. During the "flush times" of this period Mississippi, like many other Southern and Western States, fell a victim to financial extravagance and speculation, one of the results of which was the repudiation by the State of $5,000,000 in bonds which it had issued for the purpose of acquiring stock in the Union Bank. The supreme court of the State decided in favor of the liability of the State for the payment of the bonds, but the people, in an election in which this was the main issue, decided otherwise, and the Legislature refused to make any appropriation for the purpose. A little later $2,000,000 of the Planters' Bank bonds were repudiated under similar circumstances. Upon the outbreak of the Mexican War Mississippi was called upon to furnish one regiment of volunteers, but more than enough men for two regiments responded. The first regiment was commanded by Col. Jefferson Davis, who won great distinction at the battle of Buena Vista. In 1851 occurred the first important struggle in Mississippi over the slavery question, which had become serious on account of the enactment by Congress of the so-called Compromise Measures of 1850. The Democratic party in Mississippi adopted a platform favoring secession and nominated Jefferson Davis for Governor, while the Whigs declared their attachment to the Union and nominated United States Senator Foote as their standard bearer. The Union party won a substantial victory, and the slavery question rested until 1856, when the question of secession was again agitated on account of the fear that Frémont would be elected President. The news of John Brown's raid in 1859 led the Legislature to appropriate $150,000 for the purchase of military supplies and for the organization of the militia. It was left, however, for the election of Lincoln to bring the secession movement to a head. An ordinance of secession was passed on Jan. 9, 1861, by a convention, by a vote of 84 to 15, and the State constitution was amended to bring it into conformity with the constitution of the Confederate States. During the Civil War the people of Mississippi suffered greatly, and in 1863 and 1864 especially a large part of the State was devastated by the contending armies. Almost all semblance of government had disappeared. (For the military operations in Mississippi, see CIVIL WAR; CORINTH; IUKA; VICKSBURG.) In June, 1865, Governor Clarke was removed, and a provisional Governor was appointed by President Johnson. On July 21 slavery was abolished by a State convention, and on the following day the ordinance of secession was repealed. In December the State government was given over into the hands of the duly elected officers, who proceeded to reorganize the State militia for the public defense, a course in which they were upheld by the President. Limited civil rights were conferred on the freedman, but the Fourteenth Amendment was rejected in January, 1867, and in March the State came under military government.

In January, 1868, a convention framed a new constitution, conferring the suffrage on negroes. The conservative element vehemently opposed the constitution because of the severe penalties it imposed on members of the government and armies of the Confederacy, and brought about its rejection at a popular election. Resubmitted in November, 1869, with the test oath and disfranchisement clauses to be voted on separately, the constitution was adopted almost unanimously, while the independent clauses were as unanimously rejected. In January, 1870, the Fourteenth and Fifteenth amendments were ratified, and on Feb. 17, 1870, the State was readmitted into the Union. The period before 1875 was marked by a spirit of bitter hatred between the old Democrats and the newly enfranchised negroes, together with their leaders, the white Republicans. The feeling of animosity was intensified by the unhappy financial condition of the State and by the dishonesty and incapacity of its officers, very many of whom were ignorant negroes, the tools of scheming politicians. Bloody collisions between whites and negroes were frequent in 1874 and 1875, in one of which, at Vicksburg, 29 negroes and several whites were killed. The desperate attempts of the "conservatives" to restore the supremacy of the white population proved finally successful

in 1875, when the Democratic party captured the Legislature. The Republican Governor and Lieutenant Governor and the Superintendent of Education were driven from office by impeachment or threats of impeachment, and since then the Democratic party has retained an overwhelming predominance. The 20 years after 1865 were a period of economic depression, the result of the havoc wrought by the war and of the difficulties encountered in readjusting production to the new conditions of labor, but later the rise of manufactures marked the beginning of a bright era. The racial problem assumed a momentous aspect in 1844, when a vast migration of colored men into the swamp lands of Mississippi seemed to threaten the rise of a negro State within the State of Mississippi. The policy of fortifying the white race in power was continued. By the constitution of 1890 the suffrage was restricted to those able to read a section of the Constitution or to interpret any passage if read aloud, a provision aimed against the negro voter and sufficiently successful in attaining its aim. (See *Government*, above.) In national elections Mississippi has been a Democratic State with the exception of the year 1840, when it voted for the Whig candidate, and of 1872, when its vote was given to Grant. In 1864 and 1868 its vote was not counted. While the Democratic party is practically the only political organization, there was from the first years of the twentieth century a condition of political turmoil which was hardly surpassed in other States where the great political parties have strong rival organizations. In 1904 James K. Vardaman was elected Governor. His chief political tenet was the disfranchisement of the negro, not only in the State but in the nation, by means of the repeal of the Fourteenth Amendment of the Constitution. During his term, 1907, it became necessary to elect a United States Senator for the term beginning March 4, 1911. In Mississippi the Senators take their seats four years after election. Governor Vardaman was a candidate for the Senate and was opposed by John Sharp Williams, then a Representative in Congress. The contest was one of great bitterness, and among its features was a series of joint debates between the two candidates. At the primary election held in August, 1907, Mr. Williams received a majority of about 1000 votes. On November 5 of that year E. F. Noel was elected Governor. The Legislature of 1908 passed a statutory prohibition bill which became operative on Jan. 1, 1909. An attempt made to pass a measure for constitutional prohibition was defeated. In the election for President in 1908 Bryan received 60,876 votes, Taft 4505, and Watson 1057. On Dec. 26, 1909, Senator A. J. McLaurin died, and Col. James Gordon, a Confederate veteran of the Civil War, was appointed by the Governor to fill the vacancy until a successor to Senator McLaurin could be chosen by the Legislature. This election by the Legislature in 1910 resulted in a fierce and prolonged factional battle. After the deadlock lasting seven weeks Le Roy T. Percy was elected. He was opposed by Mr. Vardaman, who, shortly after Senator Percy had taken his seat in the Senate, caused charges to be made that the latter's election had resulted from bribery and corruption. After an investigation Senator Percy was entirely exonerated. In 1911 another senatorial election was held for the term beginning March, 1913, when Senator Percy's term expired. He was a candidate for reëlection and was again opposed by Mr. Vardaman. In this election the latter was successful. Earl Brewer was chosen Governor. Mr. Vardaman was elected by the Legislature in 1912. On March 5 of that year the Legislature, which was controlled by friends of Mr. Vardaman, demanded the resignation of Senator Percy on the ground that he had promised to resign if he were defeated in the primaries for nomination, a procedure altogether unprecedented in the history of American politics. Senator Percy denied that such a pledge had been made and continued to serve out his term. In the presidential election of 1912 Wilson received 57,227 votes, Roosevelt 3645, Taft 1595, and Debs 2161. In 1912–13 the State suffered much from floods of the Mississippi River. In 1914 several amendments to the constitution were adopted. The number of supreme court judges was increased to six, and their term of office was made eight years. The Governors follow:

TERRITORIAL

Winthrop Sargent		1798–1801
John Steele (acting Governor)		1801
William C. C. Claiborne		1801–03
Cate West (acting Governor and Governor ad int.)		1804
Robert Williams		1805–09
David Holmes		1809–17

STATE

David Holmes	Democrat-Republican	1817–20
George Poindexter	Democrat	1820–22
Walter Leake	"	1822–25
Gerard C. Brandon (ad int.)	"	1825
David Holmes (ad int.)	"	1826
Gerard C. Brandon	"	1827
Gerard C. Brandon	"	1828–32
Abram M. Scott	"	1832–33
Charles Lynch (ad int.)	"	1833
Hiram G. Runnels	"	1833–35
John A. Quitman	Whig	1835
Charles Lynch	Democrat	1836–38
Alexander G. McNutt	"	1838–42
Tilghman M. Tucker	"	1842–44
Albert G. Brown	"	1844–48
Joseph W. Matthews	"	1848–50
John A. Quitman	"	1850–51
John J. Guion (ad int.)	"	1851
James Whitfield (ad int.)	"	1851
Henry S. Foote	Union Democrat	1852–54
John J. McRae	Democrat	1854–58
William McWillie	"	1858–60
John J. Pettus	"	1860–62
Jacob Thompson	"	1862–64
Charles Clarke	"	1864–65
W. L. Sharkey (provisional)		1865
Benjamin G. Humphreys	Democrat	1865–68
Adelbert Ames (provisional)		1868–70
James L. Alcorn	Republican	1870–71
Ridgley C. Powers (acting)	"	1871–74
Adelbert Ames	"	1874–76
John M. Stone	Democrat	1876–82
Robert Lowry	"	1882–90
John M. Stone	"	1890–96
Anselm J. McLaurin	"	1896–1900
A. H. Longino	"	1900–04
James K. Vardaman	"	1904–08
Edward F. Noel	"	1908–12
Earl Brewer	"	1912–16
T. G. Bilbo	"	1916–20
L. M. Russell	"	1920–

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MISSISSIPPI, UNIVERSITY OF. A State university chartered in 1844 and opened in 1848, at Oxford, Miss., and maintained until 1880 by annual grants by the Legislature. From 1861 to 1865 exercises were suspended, owing to the resignation of the faculty. In 1870 the policy of separate schools, with optional studies and with courses leading to other degrees besides that of B.A., was adopted. There are seven undergraduate courses, partly elective, leading to the bachelor's degree in arts, science, pedagogy, philosophy, mining, and civil and electrical engineering. The university also maintains a law school, a medical department, and a summer school and confers the degrees of M.A. and Ph.D. In 1892 the preparatory education was discontinued at the university. The requirements for admission are those adopted by the Association of Colleges and Preparatory Schools of the Southern States, of which the university is one of the original members. Students from approved high schools are admitted without examination. Since 1882 women are admitted. The faculty consisted in 1915 of 35 instructors, and the students numbered 528. The library contained 25,000 volumes. The total endowment was about $700,000, with a gross income of $138,226. The buildings and grounds were valued at $500,000, the total value of the property being $1,300,000. The president in 1915 was Joseph N. Powers, LL.D.

MISSISSIPPI AGRICULTURAL AND MECHANICAL COLLEGE. An institution for agricultural and scientific education, established by an Act of the Legislature in 1878 at Agricultural College, Miss. The curriculum includes a two-year training course and four courses of instruction—agricultural, mechanical, industrial education, and general science—with provisions for graduate work and summer sessions. The degrees conferred are bachelor and master of science. There is also an honorary degree of master of progressive agriculture. The bona-fide residents of Mississippi receive free tuition; other students are required to pay a fee of $50 per session. Instruction in military government is given by an officer of the United States army, and all students are required to wear a prescribed uniform within 5 miles of the college campus. During the regular sessions of the college the attendance of women is not permitted. The total enrollment in all departments in the session of 1914–15 was 1140. This does not include the Summer School. The faculty, teaching force, and officers of administration numbered 105. The value of the property at the end of the collegiate year 1913–14 was $1,329,776; the income was $537,580, of which $246,008 was from State appropriations and $60,817 from Federal appropriations. The library contains about 33,000 bound volumes and 65,000 unbound volumes. The president in 1915 was G. R. Hightower.

MISSISSIPPI BUBBLE. See MISSISSIPPI SCHEME.

MISSISSIP'PIAN SERIES. A group of limestones outcropping in the upper Mississippi valley and also in Arkansas and Texas. It is the equivalent of the Lower Carboniferous in the Appalachian States. See CARBONIFEROUS SYSTEM.

MISSISSIPPI CATFISH. The largest of North American catfish (*Ameiurus lacustris*, or *Ictalurus ponderosus*), which may reach 150 pounds in weight, is sold in all the markets of its region and is regarded by many as good food. It inhabits the Great Lakes and all the larger waters of the Saskatchewan, Mississippi, and Missouri valleys. In color it is greenish slate, growing darker with age, the sides paler, without spots. (See CATFISH.) Among its many local names in the South are flannel mouth and mud cat.

MISSISSIPPI COLLEGE. An institution of learning at Clinton, Miss., founded in 1826. It has a preparatory and a collegiate department with an attendance in 1914 of 462 students and a faculty of 18 instructors. The library contained about 4000 volumes. The college buildings are valued at $225,000, and the property of the institution at about $700,000. The endowment is $125,000, and the gross income $25,000.

MISSISSIPPI RIVER (Algonquin, *Missi Sepe*, great river; lit., father of waters). The principal river of the North American continent, discovered by De Soto in 1541 (Map: United States, Eastern Part, H 4). In 1673 Marquette and Joliet descended it almost to its mouth, and in 1682 La Salle passed through it to the Gulf of Mexico and took possession of the country in the name of the King of France. Counting as a part of it the longest branch of the drainage system, the Missouri, which far overtops the central stem, it is the longest river in the world. The entire system lies within the United States, excepting the headwaters of a few tributaries of the upper Missouri, which extend a short distance beyond the northern boundary of Montana into Canada.

Location and Climate. The headwaters of the main north and south stem are in lat. 47° 09′ N., long. 95° 13′ W., and its central mouth in lat. 28° 59′ N., long. 89° 08′ W. Although well within the temperate zone, there is a wide range in climate, particularly in winter temperatures. In northern Minnesota the extreme range in temperature is from — 50° F. to + 100° F., while at New Orleans it varies from + 20° F. to + 100° F. These temperatures do not occur every year, but are likely to occur three years out of ten. The mean annual temperature at Duluth is 39° F.; at New Orleans, 69° F. The principal cities situated on the banks of the river are Minneapolis, St. Paul, La Crosse, Dubuque, Moline, Davenport, Rock Island, Burlington, Quincy, St. Louis, East St.

Louis, Cairo, Memphis, Vicksburg, Natchez, Baton Rouge, and New Orleans. The chief agricultural products in the north are wheat, barley, and potatoes; in the central States corn, oats, and rye; and in the south cotton, sugar cane, and tobacco. Fruits are grown throughout the valley, apples better in the north, and peaches more successfully in the south.

Source. Popularly Lake Itasca, since its discovery by Schoolcraft in 1832, has been considered the source of the Mississippi, and this is not far from being precise. Later explorers announced Nicollet Creek, Elk or Glazier Lake, Gagwa Dosh or Deer Creek, and Hernando de Soto Lake as the headwaters. According to an accurate contour map of Itasca State Park, issued by the Mississippi River Commission about 1910, Little Elk Lake is the ultimate source. It empties into Lake Itasca through Elk (or Excelsior) Creek and Elk Lake. Lake Itasca is surrounded by such an intricate network of smaller glacial lakes, more or less obscured by reeds and water grass, that it is easy to understand why this question was a matter of so much controversy until the whole Itasca basin was covered by a careful geodetic survey. Lake Itasca at its outlet is 2459 miles from the Gulf of Mexico, and Little Elk Lake about 7 miles farther. Lake Itasca is about 4 miles long, 30 feet deep, and about 1470 feet above sea level. Little Elk Lake is about half a mile long, 600 feet wide, and about 100 feet higher than Lake Itasca.

General Description. The Mississippi as it flows from the north end of Lake Itasca is ordinarily less than 20 feet wide and 2 feet deep. It flows swiftly over shoals and bowlders in a northwesterly direction for a distance of 62 miles by river, or 32 along the axis of the valley, to Lac Travers or Lake Bemidji, covering about 20 square miles, surrounded by forested hills. The Mississippi as it flows from the east side of Lake Bemidji is at the most northern point of its course. Seventeen miles farther on it enters Cass Lake, and 12 miles beyond Cass Lake it enters Lake Winnibigoshish. From Lake Winnibigoshish the river flows southeastward for 24 miles and unites with Leech Lake River, which is nearly as large as the Mississippi and furnishes the outlet for Leech Lake, which covers about 250 square miles and is the largest of the lakes constituting the headwaters of the Mississippi. Forty miles farther is found the first rock in place, a bed of sandstone, where the Falls of Pokegama have been submerged by two dams. Eighty miles below Pokegama the waters of Sandy Lake empty into the Mississippi through a storage dam, and 82 miles below Sandy Lake enters Pine River, which is dammed a short distance above its mouth to regulate the outflow from Whitefish Lake. Twenty-two miles below Pine River is located the town of Brainerd (q.v.), with a water-power dam with a 15-foot head. Between Brainerd and Minneapolis occurs a series of dams and rapids having a total fall, with the Brainerd Dam, of 444 feet. The Crow Wing River, which is nearly as large as the Mississippi, enters 11 miles below Brainerd. At the Sauk Rapids, 60 miles below the Crow Wing and at the entrance of Sauk River, begin the first rocky banks of Potsdam sandstone, which are in frequent evidence from this point down to the head of the Rock Island Rapids, 350 miles below St. Paul.

The entire drainage basin of the Mississippi above Minneapolis is covered with a blanket of glacial drift, 100 to 300 feet thick, consisting of a mixture of clay and gravel. Its surface is very irregular and is broken by thousands of glacial pot holes, resulting in a vast multiude of lakes and swamps, estimated by some at 5000 to 6000 in number. At the Falls of St. Anthony, in Minneapolis, the river pitches down a vertical falls and rapids amounting to 80 feet in half a mile, leaving the clay banks for a channel that lies between vertical bluffs of sandstone, gradually increasing to a height of 300 to 500 feet as the bed sinks below the general level of the prairie. Below St. Paul the distance between the bluffs rapidly increases, so that from St. Paul to Rock Island the usual distance between bluffs is 2 to 3 miles, except at the head of the Rock Island Rapids, where they are only 1 mile apart. Their height varies from 200 to 600 feet. The débris from centuries of degradation has built up slopes at the foot of the bluffs and on all projecting ledges which are now covered with grass and trees. For more than 200 miles below St. Paul the oaks, elms, beeches, and maples are interspersed with cedars and pines. This fact, together with the greater height of the bluffs, makes this section even more beautiful than the bluffs farther south. The river flows first against one bluff and then the other in its meanderings back and forth across the valley.

Seventy-seven miles below St. Paul the vast quantities of sand brought down by the Chippewa River have choked the valley so that the river fills the entire space from bluff to bluff, forming Lake Pepin, which is approximately 25 miles long and 2 to 3 miles wide. At the Rock Island Rapids the bed of the river consists of stratified limestone in a series of folds or steps, creating 11 chains or rapids with a total fall of 21 feet in 15 miles. From this point down to Cape Girardeau, 132 miles below St. Louis and 460 miles from Rock Island, the formation is Carboniferous and the river winds back and forth between picturesque rocky bluffs 100 to 400 feet high and from 3 to 8 miles apart. The bluffs are usually partially covered with grass and trees, as above Rock Island; but from Grafton to Alton, a distance of 18 miles, and for shorter distances below St. Louis, the bluffs rise vertically from the river, forming palisades of rugged beauty. From Cape Girardeau down to Grays Point, a distance of 5 miles, the river passes the low land which constitutes the head of the St. Francis basin, through which the flood waters of the Mississippi formerly escaped in great volumes. From Grays Point to Commerce, a distance of 7 miles, the river flows through a gorge, where the water is closely confined between vertical bluffs one-half to three-fourths of a mile apart. This geological landmark is said to be a spur of the Ozark Mountains, which cross the southern part of Missouri.

The rock bluffs between which the river meanders for more than 1000 miles and the vast northern upland, mainly elevated rock with a moderate covering of soil, both terminate at Commerce, 144 miles below St. Louis and 38 miles above the mouth of the Ohio. The vast alluvial valley of great fertility extending from Commerce to the Gulf, about 1100 miles by river or 600 miles in a direct line, has been created from the river's own silt. Commerce is at the head of an ancient arm of the ocean into

which the silt-laden river poured its deposits as the present river does into the Gulf, leaving a valley as fertile as that of the Nile in its palmiest days and four times as large.

From Cairo to the Gulf the surface of the river is normally above the lands lying back from the river. The ground slopes away from the river with a gradient of about 7 feet in the first mile, decreasing gradually to 6 inches per mile at the outer edge, where the overflow from the Mississippi naturally drained away towards the Gulf through numerous bayous running parallel to the main river.

Between Cairo and Memphis, 230 miles, the river does not get far from the low bluffs on the east side of the valley and at several points impinges upon them. The river then zigzags diagonally across the wide valley and strikes the west bluff at Helena, 306 miles below Cairo. The St. Francis basin, which is 45 miles wide just below Cairo and 35 miles wide at Memphis, tapers out at Helena, where the St. Francis empties into the Mississippi. The Yazoo basin, which starts at Memphis on the east side of the river, increases in width as the St. Francis decreases, having a width of 22 miles at Helena and 60 miles opposite the mouth of the Arkansas River, which is 402 miles below Cairo. At Arkansas City, 438 miles below Cairo, the Yazoo basin reaches its maximum width, 65 miles, and the Tensas basin begins on the west bank. The Yazoo basin terminates in a wedge at Vicksburg, 600 miles below Cairo, where the Yazoo enters the Mississippi, and the latter again strikes the east bluffs, which at this point are about 200 feet high. The Tensas basin, which is from 20 to 35 miles in width, terminates at the mouth of the Red, of which the Tensas is a tributary. There is no diminution in the width of the basin, however, only a change in the name, which from this point to the Gulf is known as the Atchafalaya basin, after the Atchafalaya River, which not only carries the discharge of the Red River, but also at flood times an immense volume from the Mississippi. A narrower basin on the New Orleans side is known as the Pontchartrain basin.

Islands, Lakes, and Tributaries. Between St. Paul and the mouth of the Missouri, 658 miles, there are about 540 islands of sufficient size to be dignified with a name or number. They occur singly, in pairs, and in chains, the lower ones covered with willows, and the higher ones with cottonwoods, maples, and oaks or else cleared for cultivation. Between the mouth of the Missouri and the Ohio there are, or were, about 60 islands large enough to be designated by name. Most of them are from 2 to 3 miles long. Nearly all of these 600 islands have been connected with the mainland by wing dams or hurdles, and the channels or chutes behind them have become silted up, so that they no longer appear as islands during low water. This is particularly true below St. Louis, where most of the islands have already lost their identity except to those familiar with the river. Between Cairo and the mouth of Red River, a distance of 765 miles, there are 147 islands, usually 2 to 4 miles in length. From this point to the Gulf, 309 miles, there are only three islands, and except at these points the river sweeps along majestically in a single deep channel.

A great number of large horseshoe lakes lie adjacent to the river, particularly from Memphis to the mouth of Red River, where, in a distance of 534 miles, there are 31 of these crescent-shaped lakes, most of them from 5 to 10 miles long. These are former channels of the river which were abandoned as the result of cut-offs, described in a later paragraph. The number of tributaries, and tributaries of tributaries, which are shown in ordinary atlases aggregates about 250, of which more than 50 are navigable. The more important of the tributaries in the order of their entry, proceeding downstream from Minneapolis, are the Minnesota, St. Croix, Chippewa, Black, Wisconsin, Galena, Rock, Iowa, Des Moines, Salt, Illinois, Missouri, Kaskaskia, Ohio, St. Francis, Arkansas, Yazoo, Big Black, and Red.

Floods. The Mississippi valley receives little rain from either the Atlantic or the Pacific coast. A small percentage comes from the Great Lakes, but the heavy rains which produce great floods come from the Gulf of Mexico. In winter and spring the surface of the ground is cooler than the waters of the Gulf, and as the moisture-laden winds sweep northward they become cooled and create snow and rain. A wind from the southwest will sweep across the Ohio valley; one from the south up the Mississippi; one from the southeast across the valleys of the Red, the Arkansas, and the Missouri; but in all cases the greatest rainfall will occur near the Gulf and gradually decrease as the winds travel inland. Floods do not arise from mean conditions, but from heavy rainfalls of long duration; if the ground is frozen or saturated, the run-off is proportionately greater. The maximum discharge of the upper Mississippi is 450,000 cubic feet per second; the Missouri, on account of its great length, 900,000; the Ohio, 1,400,000; the Arkansas, 450,000; and the Red, 220,000. There is also a large discharge from the St. Francis, Yazoo, White, and Tensas. Below Cairo the river overflows its banks when the discharge exceeds 1,000,000 cubic feet per second. The flood of 1912 was the greatest below Cairo of which we have definite knowledge and amounted to about 2,000,000 cubic feet per second at Cairo and 2,300,000 flowing into the Gulf. This flood was due to the coincidence of moderately high floods from the Missouri, upper Mississippi, Ohio, Wabash, Tennessee, and Cumberland rivers, supplemented by excessive rains covering the alluvial valley and the watersheds of the southern tributaries.

The alluvial valley having been built up by floods, it follows that they must have always occurred. Naturally only the more disastrous floods are remembered and recorded, and the older ones are gradually forgotten as those of more recent date attract the attention. The floods of 1785, 1828, and 1844 were of abnormal height and did great damage, and stirred the people in the valley to renewed efforts at levee construction. Then came the great floods of 1851 and 1858. The latter was regarded as the greatest which had ever come down the river and overtopped practically all of the levees in existence at that time. Active repair work and extensions were followed by other great floods in 1862, 1865, and 1867, which supplemented the havoc of the war and did millions of dollars' worth of damage. Active reconstruction was followed by the great flood of 1874, which in many parts of the valley proved to be the most disastrous of all. Then in 1882, 1883, and 1884 the valley was visited for the first time by three

excessive floods in three successive years. In 1882 there were 284 crevasses; in 1883, 224; in 1884, 204: 712 crevasses in three years! A large part of the lands reverted to the States on account of the inability of the owners to pay the heavy levee taxes, and in 1882 the Federal government came to the rescue and began its coöperation with State and local organizations, as stated in the section on *Levees*. The greatest activity ever witnessed on the levees followed, and the results were most encouraging.

Floods of greater volume than that of 1874 also occurred in 1886, 1887, 1892, and 1893, but, on account of the greatly improved levee system, these were all safely passed without material damage except that due to erosion. But in 1897 came another of unusual severity, causing 47 crevasses and flooding 20,000 square miles. This was followed by even greater activity in levee construction, and after the flood of the following year the Mississippi River Commission reported: "This is the first time in the history of the river since the commencement of the continuous levee system that a flood reaching the height of 49.8 feet on the gauge at Cairo has been carried to the Gulf without a single break in the levee." For five years the levees successfully held back the floods, but in 1903 another great flood came, and the levees were again breached, doing enormous damage. In 1907 the flood was only a trifle lower than that of 1903. The next year was remarkable for four moderate floods in succession, beginning in February and ending in June, followed by another in 1909. The latter was about as large as that of 1874, but all were carried through to the Gulf without any break in the levees.

In 1912 came the greatest flood on record (as measured by the volume of water) causing 14 crevasses below Cairo and a loss in property estimated at $42,000,000. There was some loss of human life, but the number of lives lost was never ascertained. The army officers reported that 272,000 people were furnished food and shelter.

In 1913 two distinct and excessive floods passed Cairo, the first in January and the second in April. The second exceeded in height all previous records for nearly the entire distance from Cairo to the Gulf. Like that of the preceding year it was caused by excessive rains throughout the valley. The precipitation at a number of Weather Bureau stations in Ohio exceeded all previous records for a like period of time. At Cincinnati the Ohio rose 21 feet in one day. The flood of January was kept within the levees except at Beulah, where a break of the previous year had not yet been completely closed. This crevasse attained a width of 1000 feet and overflowed about 2100 square miles. During February and March it was closed successfully at great cost by means of a trestle, using 1374 cars of rock and 145,000 cubic yards of earth. During the April flood six crevasses occurred, overflowing 2568 square miles, but in addition 6756 square miles were overflowed by water coming through various unleveed sections.

An important contributory cause of repeated failures after so many years of levee building is the fact that, as the areas formerly subject to overflow are more and more protected from overflow, the channel left for the flood waters has become more and more restricted and the water surface has steadily risen. The former flood width of 20 to 80 miles by 1915 had been reduced to about 5 miles and the flood height increased about 10 feet. This was anticipated and correctly computed 20 years previously, but the funds available were not sufficient to enlarge the levees to the full cross section required. The waters of the upper Mississippi, Missouri, and Ohio having been combined at Cairo, the gauge at that point is an accurate index of the relative volumes of different years, particularly since it is not so much affected by breaks or extensions in the levee system as the gauges farther down. However, two floods passing Cairo at the same stage do not always remain of the same proportions throughout the lower valley, as they are affected to some extent by the discharge from the tributaries below Cairo.

FLOOD HEIGHTS ON THE CAIRO GAUGE*

Year	Day	Feet
1858	June 21	49.53
1859	May 7	46.49
1862	May 2	50.76
1865	March 19	47.90
1867	March 21	50.97
1874	April 26	47.37
1876	April 6	46.38
1882	February 26	51.87
1883	February 27	52.17
1884	February 22	51.79
1886	April 19	51.02
1887	March 9	48.50
1892	April 28	48.29
1893	May 9	49.33
1897	March 25	51.72
1898	April 6	49.78
1899	April 2	46.24
1903	March 16	50.57
1904	April 5	49.10
1906	April 9	46.90
1907	January 27	50.33
1908	March 19	45.55
1909	March 16	47.27
1912	April 6	53.94
1913	January 28	48.89
1913	April 7	54.69

*Extreme low water is —1.0.

Watershed. The area drained by the Mississippi River and its tributaries extends from the Alleghany Mountains to the Rocky Mountains and from the St. Lawrence basin to the Gulf of Mexico—1,240,050 square miles, or 41 per cent of the mainland of the United States, exclusive of Alaska. The areas of the principal river basins which form this immense watershed are as follows:

DESIGNATION	Area, sq. miles	Percentage of whole
Missouri	527,150	43
Upper Mississippi	165,900	13
Ohio	201,700	16
Middle and lower Mississippi	69,000	6
Arkansas	186,300	15
Red	90,000	7
Total	1,240,051	100

Divisions and Length. For purposes of investigation and improvement the Mississippi River is divided by the government engineers as shown in the districts tabulated on page 13. These distances are measured along a line midway between the banks. Distances measured along the steamboat channel are more than 10 per cent greater. In volume of sediment and

other characteristics the Missouri River is the main stream and should have been named the Mississippi. Measuring from the headwaters of the Missouri River to the Gulf, it has a total length of 4200 miles, the longest river in the world.

Slopes, Water Power, Locks, and Dams. From Lake Itasca, which is 1472 feet above sea level, to Bemidji there is a fall of 130 feet in 32 miles. At Bemidji there is a power dam with a head of 22 feet. From this point to Brainerd, a distance of 300 miles, the river flows through

DISTRICT	Length miles
Little Elk Lake to St. Paul	534
St. Paul to mouth of Missouri River (upper Mississippi)	658
Mouth of Missouri River to mouth of Ohio River (middle Mississippi)	200
Mouth of Ohio River to head of passes (lower Mississippi)	1,060
South Pass	14
Total	2,466

Reservoirs and Capacities. Near the headwaters of the Mississippi a series of lakes have been dammed by the government in order to create a system of storage reservoirs for increasing the low-water flow and depth of navigable channel of the upper river. The capacities of these reservoirs are given in the accompanying table; together they constitute the largest reservoir system in the world.

NAME	Storage capacity, cu. ft.
Lake Winnibigoshish and Cass Lake	43,992,000,000
Leech Lake	33,094,300,000
Pokegama Lake	5,260,000,000
Sandy Lake	3,157,900,000
Pine River	7,732,900,000
Gull Lake	4,910,100,000

Widths, Natural and Artificial. From Lake Itasca to Minneapolis the width of the river increases gradually from less than 50 to more than 400 feet at ordinary stages. Under the adopted project for the deepening of the river the low-water width is contracted to 300 feet at St. Paul. As the volume is increased by various tributaries this width is increased by degrees to 600, 700, 900, 1000, 1200, and 1400 feet, the latter width being for the reach between the mouths of the Illinois and Missouri. On the Rock Island Rapids the width between contraction works is 250 to 400 feet. Where the Des Moines Rapids formerly existed there is now a beautiful artificial lake about a mile wide and 50 to 60 miles long, created by the new concrete power dam at Keokuk. The natural width from St. Paul to the mouth of the Missouri is from two to three times these project widths, except in Lake Pepin, where the natural width of 2 miles has not been disturbed.

From the mouth of the Missouri to the mouth of the Ohio the project width is 2500 feet, although the widths in the unimproved sections vary from 800 to 5000 feet. The widths in this reach at a bank-full stage vary from 1600 to 7000 feet. The flood width, before the construction of levees, extended from bluff to bluff, an average distance of 5 miles.

Below Cairo the project width is 3000 feet, the natural low-water width 1000 to 7500 feet, and the bank-full width 2000 to 10,500 feet. Previous to the construction of levees the area subject to overflow had an average width of 40 miles. In 1915 the average restricted flood width was 5 to 10 miles, decreasing to about 1 mile below Baton Rouge.

a country which is largely swampy, but the flat slopes of the river are interrupted by the storage dams at Lake Winnibigoshish and Pokegama Lake, by a power dam at Grand Rapids, and by several smaller rapids farther downstream. The crest of the Brainerd power dam is 1172 feet above sea level. From this point to Minneapolis, a distance of 150 miles, there is a fall of 444 feet, 80 of which is in the falls and rapids of St. Anthony. About 135 feet of this 444 is utilized by six power dams; the remainder is wasted.

Between Minneapolis and St. Paul the United States government in 1915 completed a large lock and power dam, with a lift of 30 feet, which permits the packets from St. Louis to reach Minneapolis. From this point to Le Claire, at the head of the Rock Island Rapids, the average slope is about 0.4 foot per mile, except in Lake Pepin, where the river has a fall of less than 0.2 foot in 24 miles. At the Rock Island Rapids there is a fall of 21 feet in 15 miles. From this point to the head of Cooper Lake at Burlington, a distance of 84 miles, there is an average slope of 0.35 foot per mile.

Cooper Lake, named after the civil engineer who designed and built the hydroelectric power plant at Keokuk, is 50 to 60 miles long and nearly level. The head on the dam and the lift in the new government lock will vary from 30 to 40 feet, according to the amount of water stored in the pool. From Keokuk to Grafton, at the mouth of the Illinois River, a distance of 150 miles, there is a slope of 0.5 foot per mile; from Grafton to the Eads Bridge at St. Louis, 0.66 per mile, although the maximum at the Chain of Rocks above St. Louis is 1.3 and the minimum, in the St. Louis harbor, 0.2 per mile. Low water at this point is 378 feet above Gulf level.

From the Eads Bridge to Cairo the average slope is 0.6 foot per mile; from Cairo to Vicksburg, 600 miles by river, 0.38 per mile; from Vicksburg to the mouth of Red River, 154 miles, 0.24 per mile. This point is over 300 miles from the Gulf and only 3 feet above Gulf level. Practically all of this head is used up in the next 70 miles, so that at Baton Rouge, 240 miles from the Gulf, low water is only 0.2 foot above mean Gulf level. Although the tides at the mouth of the river amount to only 1 to 2 feet, their effect extends up the river to Baton Rouge, and below this point there is a slight negative slope during high tide. In other words, contrary to popular opinion, water does run "up hill" under certain conditions.

Depths, Prior and Subsequent to Improvement. Between St. Paul and St. Louis, prior

to improvement, the depths on the bars or crossings at low water did not exceed 2 to 2.5 feet, especially in the upper sections and on the Rock Island and Des Moines Rapids. About two-thirds of this division has now been improved to a low-water depth of 6 feet. Where the improvements have not been completed, depths of not less than 4 feet are maintained by dredging. From St. Louis to Cairo the minimum depths, previous to improvement, did not exceed 3.5 to 4 feet at low water. At present, by means of improvement works and dredging, a depth of 8 feet is maintained. From Cairo to the Gulf the minimum depths, prior to improvement, did not exceed 4.5 to 6 feet at low water. At the present time, by means of improvement works and dredging, primarily the latter, a minimum depth of 9 feet is maintained from Cairo to Vicksburg. Below Vicksburg no dredging is required, the least depths being 11 feet from Vicksburg to Baton Rouge, 35 feet from Baton Rouge to New Orleans, 62 feet from New Orleans to Quarantine Station, and 30 feet to the Gulf through either the South Pass or the Southwest Pass.

NATURAL DISCHARGE OF MISSISSIPPI RIVER

NAME OF STATION	Distance from Gulf, miles	Ordinary low-water discharge, cubic feet per second	Maximum flood discharge, cubic feet per second
Above Cass Lake	2,370	100	2,000
Grand Rapids, Minn.	2,278	500	10,000
Brainerd, Minn.	2,107	1,500	40,000
St. Paul, Minn.	1,934	3,000	110,000
Winona, Minn.	1,814	6,000	130,000
Clayton, Iowa	1,711	12,000	200,000
Keokuk, Iowa	1,447	18,000	372,000
Grafton, Ill.	1,295	20,000	425,000
St. Louis, Mo.	1,257	35,000	1,146,000
Columbus, Ky.	1,052	70,000	2,015,000
Helena, Ark.	768	77,000	2,041,000
Arkansas City, Ark.	636	92,000	2,007,000
Vicksburg, Miss.	475	97,000	1,783,000
Red River Landing, La.	309	94,000	1,595,000
New Orleans, La.	110	94,000	1,358,000
Mississippi + Atchafalaya + crevasses		100,000	2,300,000

Velocity of Current. The velocity of the current is a function of the depth as well as of the slope. It varies greatly, therefore, between low and high water at every point on the river. The velocity at low water, however, does not differ greatly on the upper and lower river, as the greater depths on the lower river are largely counterbalanced by the flatter slopes. Roughly speaking, the velocity at low water, from St. Paul to St. Louis, except on the rapids, varies from 1 to 2 feet per second, and from St. Louis to New Orleans from 1 to 2.5 feet, while the high-water velocities vary from 3 to 6 feet on the upper river and from 6 to 8 feet on the lower river. The greatest velocity that has been noted on the river occurred under the Merchants Bridge at St. Louis during the flood of 1892, when a mean velocity of 12.2 feet per second was measured. The excessive contraction of the waterway under the bridge caused the bottom to scour out to a depth of 86 feet on this occasion. To obtain the velocities in miles per hour multiply the preceding figures by 0.7.

Discharge. The ordinary or normal low-water discharge and the maximum flood discharge of the river at typical points are shown in the accompanying table. By ordinary or normal low water is meant the lowest stage which occurs during the navigation season. Occasionally in midwinter, when the tributaries above St. Louis are all frozen over, the discharge at and above St. Louis may be 25 per cent less than is shown in the table. Since the opening of the Chicago Drainage Canal in January, 1900, about 5000 cubic feet per second have been taken from Lake Michigan through the Chicago River, the Chicago Drainage Canal, the Des Plaines and Illinois rivers and discharged into the Mississippi at Grafton. At and below Grafton, therefore, the present low-water discharge is 5000 cubic feet per second greater than the natural discharge shown in the table.

These low-water discharges do not occur every summer, but only once in five to ten years. The low-water discharge shown for St. Louis corresponds to a zero stage on the St. Louis gauge, while "standard low water," which is approximately the average annual low water during the navigation season, corresponds to a discharge of 63,000 cubic feet per second.

Just above Red River Landing is the mouth of the Red River, which also serves as the mouth, or rather as the headwaters, of the Atchafalaya River, because ordinarily the latter takes all of the discharge from the Red River and also some from the Mississippi River, as indicated in the table. The reduction in flood discharge below Helena is due to crevasses or breaks in the levees, as described further on under LEVEES.

Caving Banks. In the volume of its caving banks the Mississippi probably surpasses every other river that man has yet attempted to improve. In the superficial area of its caving banks it is exceeded by the Missouri, but on account of the higher banks and greater depths of water on the Mississippi the volume of earth falling into the river is greater along the latter. Previous to revetment some caving occurred on the upper Mississippi as far north as Keokuk, but caving on a large scale really begins at the mouth of the Missouri River and increases in extent downstream, reaching a maximum in the vicinity of Vicksburg. Below the mouth of Red River the caving gradually diminishes until at Donaldsonville it practically ceases.

From Cairo to Red River the extent of the caving banks was measured in 1907 and 1908, and it was found that 411 miles of bank were caving at low water and 708 miles at high water, or, deducting for the banks which were caving at both low and high water, a total of 749 miles in 754 miles of river. In other words, caving is taking place on one bank or the other or on some island practically the entire distance. A

similar survey in 1892, before much revetment work had been done, showed 921 miles of caving banks in the 885 miles from Cairo to Donaldsonville. The same survey showed that the average annual caving in this distance amounted to 38,991,000 square yards, or 12.6 square miles in area by 66 feet in depth, or more than 1,000,000 cubic yards per mile of river. Similar measurements between Cairo and St. Louis show that from 1879 to 1889 the average annual amount of caving was 64,000,000 cubic yards, while from 1889 to 1907 the average annual amount was 48,000,000, the diminution being due to the extensive revetment work executed in the meantime.

Caving banks have been classified as eroding banks, slumping banks, sinking banks, and sliding or slipping banks. As most of the damage is done by the first method, no further reference will be made to the others. A typical eroding bank is one whose soil is not cohesive enough to withstand the scouring and dissolving action of the ordinary river currents. As the velocity of the current increases with the stage, the erosion increases correspondingly, provided the direction of the current remains the same. As the direction of the current is frequently different at high water, caving, while much more extensive, does not always occur at the same places. In erosion the bank is undercut or undermined below the water surface until the weight of the portion above the water causes it to break away and fall into the river. A recession in the shore line of 300 to 600 feet in a single season is a common occurrence.

Sinuosities. Experiments on a large scale show that a running stream in an alluvial bed will not remain straight. Owing to variations in the cohesive strength of the soil, irregularities begin to develop, and the resulting curves are gradually enlarged by the centrifugal action of the currents thereby inaugurated. The resulting radius of curvature is determined largely by the volume of discharge. For example, below St. Paul the radius of curvature is 1600 to 4500 feet, while in the bends below Arkansas City it is from 8000 to 15,000 feet. When the river changes from its low-water flow to a flood discharge, it attempts to adjust its sinuosities to its increased flow. In other words, at a flood stage the current does not follow the deep bends in which it flowed during low water, but tends to flow in flatter curves, thereby shortening and changing its main channel to the confusion of the navigator.

The greatest danger to the regimen of a river occurs, however, when the erosion in one bend approaches the cutting bank in the second bend below. If left to itself, the peninsula or narrow neck of land will be eventually cut through, thereby forming a cut-off. As this disturbs the regimen of the river for many miles above and below, it is always prevented by bank revetment. If not prevented, it may require 20 to 25 years before this reach becomes as stable as it was before the cut-off took place. The last cut-off occurred in 1884, before improvement work was well organized, at Waterproof, 20 miles above Natchez, shortening the river about 12 miles.

Erosion in the bends does not widen the river because the convex bank is built out as rapidly as the other caves away, but it takes many years before the new accretion becomes high enough and fertile enough to be valuable for agricultural purposes.

The Movement of Sediment. Material is carried down the river in three ways, viz., in solution, in suspension, and by rolling along the bottom. The second is by far the greatest in volume. The material carried in suspension by the Mississippi is received almost entirely from the Missouri River. At low water the proportion of sediment in the Missouri River is about 1 part in 1000, by weight, while at a flood stage it amounts to 10 parts in 1000, or 1 per cent of the weight of water. This means that a flood of 500,000 cubic feet per second carries with it into the Mississippi about 120 cubic yards of sediment per second, or more than 10,000,000 cubic yards per day. It is estimated that 400,000,000 cubic yards per annum are carried into the Mississippi from the Missouri, and approximately the same amount passes out into the Gulf. A volume, therefore, equal to that produced by the river's own caving banks is deposited as accretions along the banks of the river and on the areas subject to overflow. A deposit or accretion occurs whenever the velocity of the current is checked, as, e.g., below a hurdle or permeable dike, where the fill frequently amounts to 10 feet during a single flood. One case is on record of a maximum deposit of 64 feet in a single year.

The movement of sand along the river bottom results in the formation of sand waves, a phenomenon similar to the formation and movement of sand dunes or snowdrifts by the wind. Sand waves on the lower river vary from 400 to 1000 feet in length, from 8 to 22 feet in height, and have a daily movement of 20 to 40 feet. They have the least dimensions and slowest rate of travel during low water and the greatest during high water.

Bars and Crossings. Concurrently with the erosion and accretion in each bend occurs another process which is equally typical of all alluvial streams, viz., the formation of a bar or submerged dam across the channel at the lower end of each bend. These do not lie normal to the banks, but extend diagonally across the river, having a length at least double the width of the river. In this way the deep water in the upper pool usually extends downstream past the head of the next pool, and the main body of water, in passing from one pool into the next, passes over this bar or natural weir in a comparatively thin sheet of water. The deepest water in a bend is always found near the concave bank, and the pilot of a vessel, in passing from the deep water in one pool to the deep water in the pool below, must make a crossing in a diagonal course from one side of the river to the other.

One of the most interesting characteristics of these bars, and a most troublesome one to the navigator, is the fact that the top or crest rises and falls with the water surface. Repeated measurements show that below St. Louis the available depth across a bar increases only about one-half foot for every foot rise in the water surface.

After a high stage, if the river falls slowly, say 0.2 or 0.3 foot per day, the current will have time to cut down the bars fast enough to maintain a good channel; but if the river falls rapidly, the result is most disastrous, as there will be bad water on the crossings until the current has time to cut them down or the hydraulic dredges to dredge a channel through them. For the guidance of the pilots the cross-

ings are indicated by lights and day marks maintained by the Lighthouse Service.

Bank Revetment. When the permanent improvement or regulation of a river like the Mississippi is undertaken, the first work necessary is the revetment or protection of its caving banks, giving the channel a fixed location and incidentally conserving the fertile bottom lands along the river and reducing the amount of sediment to be disposed of by the stream. This can be accomplished the most economically by the use of brush and stone revetment, constructed during the low-water season. Below the water the sloping bank is covered with a mattress or carpet of willow brush, covered with a single layer of rubble stone, while above the water level, where the willows would soon rot, stone alone is used in a heavier layer. The width of the mattress varies with the depth of the river and the friability of the soil. On the upper river the width varies from 25 to 35 feet; between St. Louis and Cairo the standard width is 125 feet; and below Cairo, 250 to 400 feet. On the upper and lower river the mattress is made up of fascines, or bundles of willows, fastened together with poles and wire cables, while on the middle Mississippi the mattress is made by weaving light willows under and over heavier poles, placed about 6 feet apart, parallel to the bank. The willows are 20 to 30 feet long and from 2 to 4 inches thick at the butt, except the poles, which are longer and heavier. The mattresses are made on skids supported on barges, the barges being gradually withdrawn downstream as the mattress is formed, leaving a continuous floating mattress, which is then sunk from the upstream end by loading it with stone.

Above the water level the bank is first graded by a hydraulic grader to a slope of 1, vertical, to 2.5 or 3, horizontal, and covered with rubble stone placed by hand. Where stone must be transported long distances, as on the lower Mississippi, it has been found more economical to use concrete, provided gravel may be found within a reasonable distance. The height of the banks above standard low water varies from 10 to 20 feet on the upper river, from 20 to 30 feet on the middle Mississippi, and from 40 to 60 feet on the lower river.

Contraction Works. As indicated by the name, these are built for the purpose of contracting the cross section of the river where its natural width, at low water, is too great and its depth too shallow to afford a good navigable channel. The widths to which the river is being contracted are given in the section on *Widths, Natural and Artificial.* The contraction of the entire flow within a restricted width results in scouring out the bottom to the required depth. On the upper river, where these works are called wing dams, they are built up of alternate layers of brush and stone—about two-thirds brush and one-third stone—to a height of 6 feet above mean low water. The first or lowest course projects downstream about 10 feet beyond the others so as to protect the dam from underscour.

On the middle Mississippi the contraction works consist of permeable pile dikes, locally called hurdles, the piles being driven through a brush mattress having a width of 60 to 100 feet to protect it from underscour. The piles are driven in clusters of three to four each, and each hurdle consists of two to three rows of clusters. The rows are about 3 feet apart, and the clusters 8 to 10 feet apart in the rows and staggered with those in adjoining rows. Long slender piles are then laid horizontally between rows, thereby bracing the upper row against the adjoining row. The tops of the piles are left 15 to 20 feet above low water at the channel end and 20 to 25 feet at the bank end. The piles vary from 30 to 60 feet in length, according to the depth of the water, and have a penetration of about one-third their length. On the lower river no contraction works are being built as the funds appropriated are needed more urgently for levees, bank revetment, and dredging.

Dredging and Snagging. Dredging is carried on extensively to maintain the project depth where improvement works have not yet been constructed and to supplement the scouring action of the contraction works when the river falls rapidly after a high stage. Most of this work is done by hydraulic or suction dredges, of which in 1915 there were eight on the upper river, four on the middle division, and nine on the lower river. The size of the discharge pipe is 12 to 18 inches in diameter, 28 to 32 inches, and 32 to 36 inches respectively on the three divisions of the river. The largest suction dredges have a capacity of 1000 to 2000 cubic yards of sand per hour, and the cost varies from five to ten cents per cubic yard. In addition to the suction dredges, seven dipper dredges are in use on the upper Mississippi excavating rock and other hard material, principally on the Rock Island Rapids. See DREDGE.

One snagboat above and two below the mouth of the Missouri patrol the river during the navigation season to remove snags and other obstructions which are a menace to navigation. To dispose of a snag it is hoisted on deck with machinery, the portions which will float away are sawed off in short lengths, and the heavy mass of roots is dropped in a deep pool, deposited below a wing dam, or hauled out on the bank.

Levees. The main area originally subject to overflow, amounting to 29,790 square miles, begins at Cairo on the left bank and at Cape Girardeau, 51 miles above Cairo, on the right bank. The entire levee system includes about 1570 miles of levee, of which all but 70 miles were under construction in 1915, affording protection during moderate floods to 26,570 square miles. Between Cape Girardeau and Rock Island there are additional levee lines aggregating 337 miles in length, but the area protected probably does not exceed 1000 square miles. The following remarks refer to the main area below Cairo.

The first levee was built at New Orleans about the beginning of the eighteenth century. In 1828 the State of Louisiana took up the matter quite actively and up to the time of the Civil War had expended about $18,000,000, while Mississippi was a close second with $14,000,000. The total expenditure by individuals, parishes, and States up to that time is estimated by C. G. Forshey, of New Orleans, at over $41,000,000. During the war and the years immediately following many breaks occurred, many miles fell into the river, and the remainder became badly deteriorated. Work was gradually resumed, but was not pushed actively until the United States began its coöperation in 1882. The volume in place at that time is estimated at 32,000,000 cubic yards. The total volume in the projected

system is estimated at 434,000,000 cubic yards, and the total volume in place in 1915 about 290,000,000 cubic yards, leaving a balance of about 144,000,000 cubic yards to be completed. In 1915 about 20 to 25 million cubic yards of new work were being added each year, and from 3 to 5 million cubic yards of old work lost by caving banks.

The standard levee cross section has a top width of 8 feet and side slopes of 1, vertical, to 3, horizontal. All levees over 12 feet in height are reënforced by a banquet, the top of which is 8 feet below the top of the main levee. The width of the banquet varies from 20 feet for a levee 12 feet high to 40 feet for a levee 20 feet high. The height of the levees, as a rule, varies from 15 to 25 feet, decreasing to 10 feet near the Gulf and increasing frequently to 30 feet where they cross old sloughs. The total amount expended on levees by the United States up to 1915 was about $35,000,000, and by State and local organizations about $100,000,000, or a total of about $135,000,000. The amount of money necessary to complete the system was estimated at $60,000,000 to $75,000,000.

Passes and Jetties. At the head of the passes, 96 miles below New Orleans, the river divides into three main outlets: Pass à Loutre, which takes about 50 per cent of the discharge and subdivides into three smaller passes; Southwest Pass, which takes about 40 per cent of the discharge; and South Pass, which receives only about 10 per cent. Much work was done on the bars at the mouths of these passes in attempting to maintain ship channels across them. From 1836 to 1878 about $2,500,000 were expended on various unsuccessful devices and plans. In 1875 Congress authorized James B. Eads to construct jetties and auxiliary works to develop a deep channel in the South Pass. He secured a 30-foot channel and was paid the contract price of $5,250,000 and $100,000 per annum for maintaining it from 1881 to 1900 inclusive. These are described and illustrated under JETTY.

The dredged channel in 1915 was about 75 per cent completed, about 25,000,000 cubic yards having been removed, giving a minimum width of 130 feet and a depth on the bar of 30 feet where there was originally only 9 feet. The length of the jetties is 4.5 miles, and the total length of the Southwest Pass, 19.5 miles.

Cost of Improvement. The total expenditures by the United States to June 30, 1914, on the improvement of the Mississippi River, including construction, maintenance, and operation of reservoirs, locks, and dams, are approximately as follows:

Snagging, St. Paul to New Orleans	$4,400,000
Improvement works and dredging:	
Above St. Paul	4,300,000
St. Paul to mouth of Missouri River	21,100,000
Mouth of Missouri River to Cairo	16,200,000
Cairo to head of passes	46,700,000
Passes	20,300,000
Levees	33,500,000
Total	$146,500,000

The amounts expended by the several States and local interests are not so well known, but are roughly estimated at about $100,000,000 for levees and $10,000,000 for docks and revetment works at the larger cities. The hydroelectric-power development at Keokuk represents an investment of $25,000,000. Smaller water-power plants at Rock Island, St. Paul, and points farther upstream have cost many millions more.

Commerce. On account of the hard labor involved in paddling, poling, warping, or cordeling against the current, the commerce downstream, at first carried in flatboat, pirogue, Mackinaw boat, keel boat, and barge, was always greatly in excess of that upstream. Cheap boats were built on the upper waters of every large river, floated downstream with their produce, and then sold with their cargoes or abandoned. Previous to the year 1817 the whole commerce from New Orleans to the upper country was carried in about 20 barges, averaging 100 tons each and making but one trip in each year.

The first steamboat built in the Mississippi valley was the *New Orleans*, built at Pittsburgh in 1811. She was 138 feet long, had a capacity of 300 or 400 tons, and cost $38,000. The sixth boat, the *Zebulon M. Pike*, built in 1815, was the first to ascend the Mississippi above the mouth of the Ohio and the first to touch at St. Louis (1817). By 1819, 63 boats had been built, and this indicates the rapidity with which the new form of navigation was being developed. The boats varied in size from 25 to 700 tons, but most of them ranged from 80 to 300 tons, the most popular size being 150 tons. The Cincinnati and Louisville Mail line, the first line of steamboats organized in the Mississippi valley, was established in 1818. Details of the first 63 boats built on the Mississippi and its tributaries are given in Scharf's *History of St. Louis* (Philadelphia, 1887).

On Jan. 1, 1834, an official list gave the total number of steamboats as 230, with an aggregate tonnage of 39,000. The capital invested was estimated at $3,000,000. Of this number, 36 steamboats of over 200 tons plied between New Orleans and Ohio River points with an aggregate tonnage of 12,686; 4 in the St. Louis trade with an aggregate tonnage of 1002; 7 in the cotton trade with an aggregate tonnage of 2016; 57 boats, not in established trades, from 120 to 200 tons, aggregated 8641 tons; 126, under 120 tons, in various trades, aggregated 14,655 tons; grand total, 39,000 tons. Besides the steamboats it was estimated that 4000 flatboats annually descended the river, having an aggregate tonnage of 160,000. The total number of steamboats built from 1811 to Jan. 1, 1834, was 573; the difference between that number and the 230 in service represents the number worn out and lost, principally the latter.

In 1842 the number of steamboats employed in navigating the Mississippi and its tributaries was estimated at 450 with an average capacity of 200 tons each, making an aggregate of 90,000 tons. The cost of these boats was estimated at $7,000,000, and the number of men operating them at 35,000. The first company organized to operate a line of steamboats on the upper Mississippi was established that year. The number of steamboat arrivals at St. Louis during the year 1842 was 2412, with 467,824 tons, besides 801 flatboats and exclusive of the daily packets to Alton. At New Orleans the number of arrivals was smaller, but the tonnage was larger—550,500 tons, valued at $50,000,000. The number of steamboats lost each year was surprisingly large. In 1846, 36 vessels were lost, of which 24 were sunk by snags and submerged rocks and the remainder by fire, explosion, and collision. During the same year 108 new boats were built with a tonnage of 51,660 at a cost of $1,450,000.

The transportation of coal down the Ohio and

Mississippi, which was destined to develop into such large proportions, began in a small way in the early forties. In 1844 it amounted to 737,000 bushels; in 1845, 4,605,000; in 1850, 12,298,000; in 1860, 37,948,000; in 1870, 57,596,000; in 1880, 84,048,000; in 1886, 109,895,000.

The official returns of St. Louis for the year ending June 30, 1853, show 3307 arrivals with a tonnage of 45,401. This was exceeded only by the tonnage of New Orleans and New York. In consequence of an unusual low-water season in 1860, freight rates on the upper Mississippi, Missouri, and Illinois ruled very high, and the number of marine disasters reached the astounding total of 299. This was followed by a general paralysis of all industries and commerce during the next four years, so that after the Civil War it was necessary to start all over again. In this rebuilding most of the steamboats and barges were built of larger proportions than before the war.

The rise and decline in river traffic is well shown in the accompanying extracts from the annual reports of the Merchants Exchange of St. Louis.

PORT OF ST. LOUIS

YEAR	ARRIVALS				DEPARTURES	
	No. of boats	No. of barges	Tons of freight received	Tons of lumber rafted	No. of boats	Tons of freight
1860	3,580	1,600	*450,000	No record	3,600	*400,000
1865	2,767	1,141	*910,000	" "	2,953	*865,000
1870	2,796	1,195	*930,000	" "	2,782	*824,000
1875	2,201	743	663,525	" "	2,223	639,095
1880	2,871	1,821	893,860	198,315	2,866	1,038,350
1883	2,240	1,185	629,225	231,285	2,140	677,340
1885	1,878	1,030	479,065	217,860	1,828	534,175
1890	1,927	1,274	530,790	132,940	1,910	617,985
1895	2,007	1,126	410,145	98,685	1,904	303,355
1900	1,622	595	438,670	73,340	1,605	245,585
1902	1,465	451	386,045	30,875	1,448	224,261
1905	1,074	385	288,640	1,210	1,057	80,575
1910	559	209	143,540	None	537	48,425
1914	698	38	88,655	"	694	48,935

* Approximate.

There was a decline in river commerce from 1870 to 1877, followed by a revival for a few years, since which there has been a steady decline. The decline on the Ohio and lower Mississippi has also been quite marked, but not to so large a degree as at St. Louis. The freight delivered at New Orleans by river in 1909, expressed in tons, was as follows: coal, 740,000; lumber, 110,000; gravel, 150,000; cotton, 60,000; oil, 40,000; provisions, 38,000; iron and steel, 15,000; passengers, 5000.

The cause of the decline in river commerce is a mooted question. Primarily it has been due to the more efficient service rendered by the railroads, combined with rate cutting by the railroads in favor of river towns. The latter practice was stopped by the Interstate Commerce Commission, but the damage was already done. To the above must be added (1) uncertainty and irregularity of service; (2) instability of rates; (3) short life of the individual steamboat; (4) lack of effective line organization; (5) extravagance engendered by early prosperity. The likelihood of a revival of river commerce is also a mooted question. If it is accomplished, as many hope and believe it will be, it will no doubt be along the lines successfully adopted in Europe: (1) ample and efficient river terminals maintained by the municipalities for the use of all boats; (2) the operation in each line of a large number of boats by companies with ample capital working in coöperation with the railroads; (3) the separation of freight and passenger traffic, using fast steel packets with modern accommodations for passenger service and powerful and efficient towboats with covered steel barges for freight traffic.

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MISSISSIPPI SCHEME. A gigantic banking and commercial scheme projected in France by the celebrated Scottish financier John Law (q.v.), at the beginning of the reign of Louis XV. The primary object of the scheme was to resuscitate the French finances by removing some of the debt and disorder which had followed on the wars of Louis XIV. Money was to flow into France by developing the resources of the Province of Louisiana and the country bordering on the Mississippi—a tract at that time believed to abound in the precious metals. The company was incorporated in 1717, under the designation of the Compagnie d'Occident, and started with a capital of 100,000,000 livres. Two hundred thousand shares were placed on the market and eagerly bought up. The company obtained exclusive privileges of trading to the Mississippi for 25 years, of farming the taxes, and of coining money. In 1718 the company changed its name to the Banque Royale, and the King guaranteed the notes. In 1719 it obtained a monopoly of trading to the East Indies, China, the South Seas, and all the possessions of the French East India Company, and the brilliant vision opened up to the public gaze was irresistible. The Compagnie des Indes, as it was now called, created 50,000 additional shares; but there were at least 300,000 applicants for these, and consequently shares rose to an enormous premium. The public enthusiasm became absolute frenzy, and while confidence lasted, a fictitious impulse was given to trade in Paris; the value of manufactures was increased fourfold, and the demand far exceeded the supply. The population of Paris is said to have been increased by hundreds of thousands, many of whom were glad to take shelter in garrets, kitchens, and stables. But the Regent Orléans had meanwhile caused the paper circulation of the national bank to be increased as the Mississippi scheme stock rose in value, and paper currency to the face value of 2,700,000,000 livres flooded the country. The result was that many wary speculators, foreseeing a crisis, secretly converted their paper and shares into gold, which they transmitted to England or Belgium for security. The increasing scarcity of gold and silver in France becoming felt, a general run was made on the national bank, which in February, 1720, had been incorporated with the Compagnie des Indes. On May 21 the government issued an edict which reduced the value of bank notes and of shares in the company by one-half. Law was now Comptroller General of the Finances, and he made several unavailing attempts to mend matters. Those suspected of having more than a limited amount (fixed by a law passed at the time) of gold and silver in their possession, or of having removed it from the country, were punished with the utmost vigor. The final crisis came in July, 1720, when the bank stopped payment, and Law was compelled to flee the country. A share in the Mississippi scheme now with difficulty brought 24 livres. An examination into the state of the accounts of the company was ordered by the government; much of the paper in circulation was canceled; and the rest was converted into stock.

MISSISSIPPI SOUND. A lagoon-like strait, 5 to 10 miles wide, washing the coasts of Alabama and Mississippi from Mobile Bay to the entrance of Lake Borgne, a distance of about 70 miles (Map: Mississippi, H 10). It is formed and separated from the Gulf of Mexico by several long and narrow islands or sand bars, one of which is fortified. It is generally tranquil, has a depth of from 6 to 10 feet, and is navigated chiefly by the steamers and coasting vessels running between Mobile and New Orleans by way of Lake Pontchartrain.

MISSOLONGHI, mĭs'sō-lŏn'gē, or MESOLONGHI. One of the principal towns of western Greece, the capital of the Nomarchy of Acarnania and Ætolia (Map: Greece, C 5). It is situated on the north shore of the Gulf of Patras, in a marshy and unhealthful locality. The harbor is shallow and inaccessible for large vessels. The town is the seat of an Archbishop. It has a statue of Lord Byron, who died here in 1824, and a mausoleum which contains the heart of the poet. The town is famous as the chief western stronghold of the Greek patriots during the war of liberation (1822–26). Under Markos Bozzaris it withstood a siege by the Turks in 1822, and again from 1825 until April, 1826, when the survivors of the garrison destroyed the town and cut their way through the Turkish lines. Outside the gates stands the *Heroon*, or burial place of those who died during the defense. In May, 1829, the town was evacuated by the Turks and restored to Greece. Pop., 1896, 8394; 1907, 10,702.

MISSOULA, mĭ-zōō'lȧ. A city and the county seat of Missoula Co., Mont., 125 miles by rail west by north of Helena, on the Missoula River and on the Northern Pacific and the Chicago, Milwaukee, and St. Paul railroads (Map: Montana, C 3). It is the seat of the State University, contains Fort Missoula, and has a Carnegie library, attractive Federal building, high school, and two hospitals, one maintained by the Northern Pacific Railroad. The city is in a farming and fruit-growing, lumbering, and mining region, for which it is an important distributing centre, and controls a considerable trade in grain, fruit, and produce. There are large lumber mills, a brewery and bottling works, and railroad shops of the Northern Pacific. Founded in 1864, Missoula was first incorporated in 1887, and has adopted the commission form of government. Pop., 1900, 4366; 1910, 12,869; 1914 (U. S. est.), 16,492; 1920, 12,668.

MISSOURI, mĭ-sōō'rĭ *or* mĭ-zōō'rĭ; *locally*

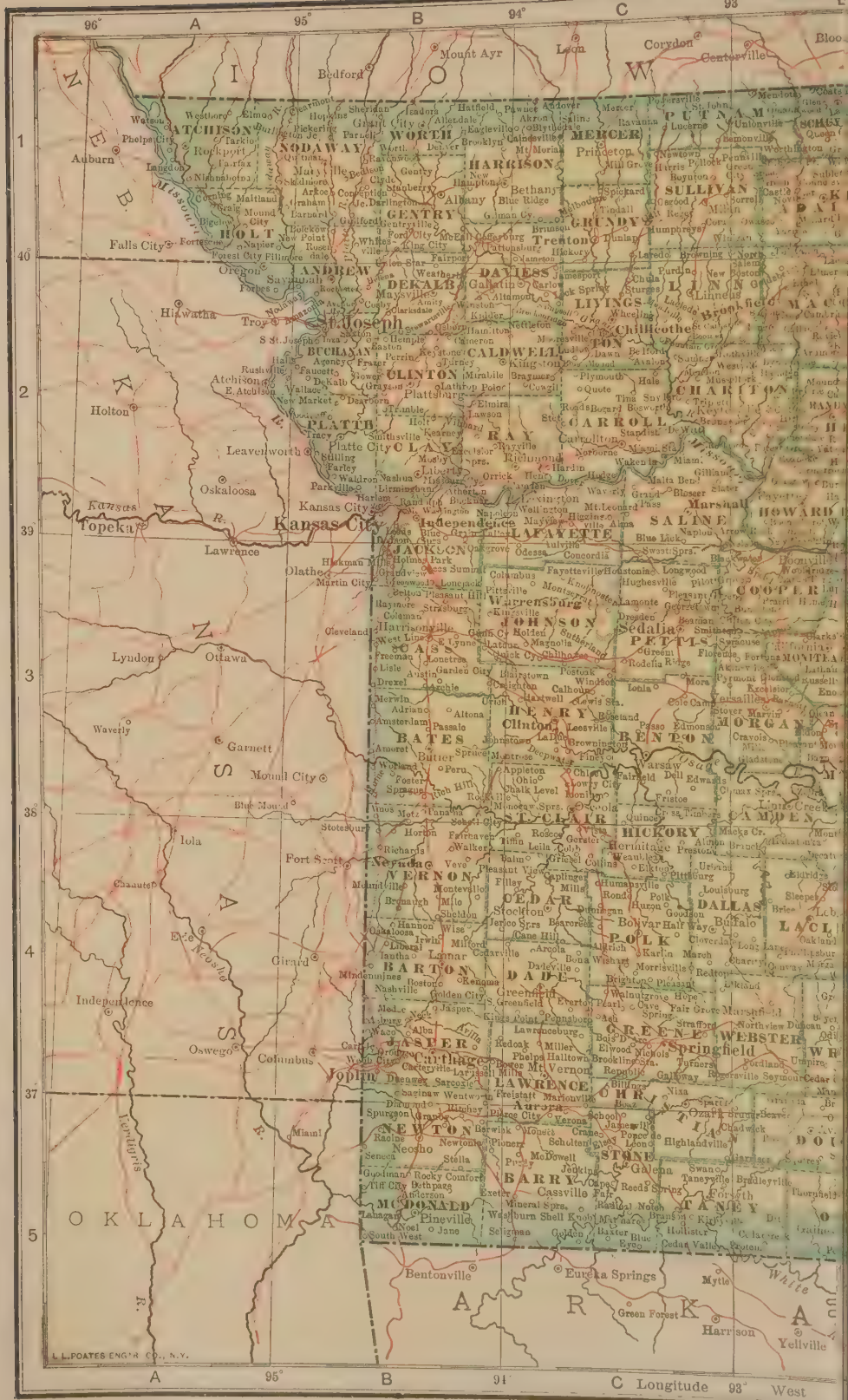
often mĭ-zo͝o′rŭ. A State of the American Union occupying a central position in the great interior lowland drained by the Mississippi and its tributaries. It lies a little to the east of the geographic centre of the country. It is separated from Iowa on the north by the parallel of 40° 30′ N. and from Arkansas on the south by that of 36° 30′ N. Its most easterly point lies in long. 89° 53′ W. Its east boundary is an irregular line marking the middle of the Mississippi River channel as it was at the time the boundary was defined, even though this is not in all cases the middle of the channel at the present time. This boundary separates the State from Illinois, Kentucky, and Tennessee. North of Kansas City the west boundary is formed by the Missouri River channel, with exceptions as just noted along the east boundary, and south of that point by the meridian of 94° 43′ W. This line separates the State from Kansas and Oklahoma. Its land area is 68,727 square miles.

Topography. The area of the State includes portions of three of the great topographic provinces of the United States, which may be designated as the prairie plains, the Ozark region (Appalachian province), and the coastal plain. These provinces are differentiated on the basis of existing topography and of history of natural evolution. The prairie plains occupy all of the northern part of the State except a narrow belt along the Missouri River east of Glasgow and one along the Mississippi in Marion, Pike, and Lincoln counties. They occupy the western part of the State west of a line running approximately from Glasgow through eastern Pettis, western Cedar, the southeastern corner of Barton, and the middle of the west boundary of Jasper counties.

Along their eastern border their upland surface lies at elevations ranging from 750 to 900 feet. Westward, leaving out of consideration the valleys, the elevation across the northern tier of counties increases gradually to about 1100 feet in Mercer County, west of which there is a very gradual decline to about 950 feet along the Missouri River bluffs. Westward along the southern counties, however, the elevation remains constant to a north-south line through Richmond, Braymer, Trenton, and Ravanna, along which there is an abrupt rise of about 100 feet. West of this there is a slight decline to the Missouri River bluffs. Along the Mississippi there is a narrow belt of sharply dissected country, best described as hilly. West of this and east of the Wabash Railway through Moberly, Macon, and Kirksville the topography consists of rather broad flat or undulating plains on the watersheds with belts of low hills bordering the valleys. West of the Wabash Railway all of the northern part of the State is essentially a rolling to undulating plain. Areas of flat upland are few and small. South of the Missouri River the prairie plains consist of a smooth to undulating eastern belt and a rolling western belt. The boundary between them runs approximately from Lexington through Odessa and Pleasant Hill and across the northwest corner of Bates County. Along this line there is a rise of about 150 feet from the lower eastern to the higher western belt. North of the Missouri River the surface of the prairie plains has a thin veneer of glacial material which does not occur south of the river. It does not, however, change the essential features of the topography from what they would be if the veneer were removed. The Ozark region occupies all that part of the State not occupied by the prairie plains except the area south of Cape Girardeau and Poplar Bluff. It is essentially a plateau which slopes gently and almost imperceptibly to the surrounding country. Its upland surface ranges in elevation, except around the border, from about 1200 feet in the eastern and central part to 1700 feet in the southwestern part. Its typical plateau surface is interrupted in Iron and adjoining counties by a number of low blunt peaks and short rounded ridges of hard igneous rocks known as the St. Francis Mountains. The plateau surface would be smooth but for the great number of valleys that traverse it. These have made of it a hilly country as a whole. The portions with the greatest number of, the deepest and most sharply cut, valleys are the White and Current River basins, the lower Niangua, and the Central Osage and Gasconade basins. The valleys reach a maximum depth of about 500 feet in the White and part of the Niangua basins and 350 feet or more in the others. In other basins besides those mentioned the valley depths are less, but usually the valley borders are very hilly. There are several rather small areas, however, that are not yet invaded by valley-making forces. The most important of these are the Salem-Rolla, the Lebanon, the Eldon, the Owensville, and the Springfield areas. The coastal plain in Missouri lies in the extreme southeastern part. It barely exists as a true coastal-plain area, most of it having been converted long ago into broad, level river valleys. The true coastal plain exists only in a narrow ridge broken into two parts known as Crowley and Benton ridges. The former runs southward through Stoddard and Dunklin counties, the latter lies in Scott County. The coastal-plain ridges are less than 150 feet high and have a rolling upland surface. The rest of the area in the State south and east of the Ozark boundary, running through Cape Girardeau, Mingo, Poplar Bluff, and Naylor, is flat alluvial land. From the foregoing it will be seen that the topography of the State, leaving the valleys out of consideration, is of plains varying in elevation. Their original surfaces have been almost completely destroyed by the cutting of valleys in them. The later, except the short ravines, are almost invariably flat-bottomed and floored with alluvial deposits. They are broadest in the coastal-plain region, reaching a maximum width of about 40 miles. In the Ozark region they are rarely more than half a mile wide, and in the prairie region they range up to a maximum, along the large rivers, of about 5 miles.

Hydrography. The State is drained by streams flowing eastward into the Mississippi River either directly or through the Missouri and Arkansas. The river systems are well developed and reach effectively practically all the upland area of the State. Swamps due to imperfectly developed river systems like those in the recently glaciated areas of the Northern States do not exist. The nearest approach to such conditions occurs on the nearly flat watershed ridges, or plains remnants, in the northeastern part of the State. They are not swampy, however.

Geology. In age the consolidated rocks underlying the area of the State are Archean, Paleozoic, and Cenozoic. In mineralogical character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40
39
38
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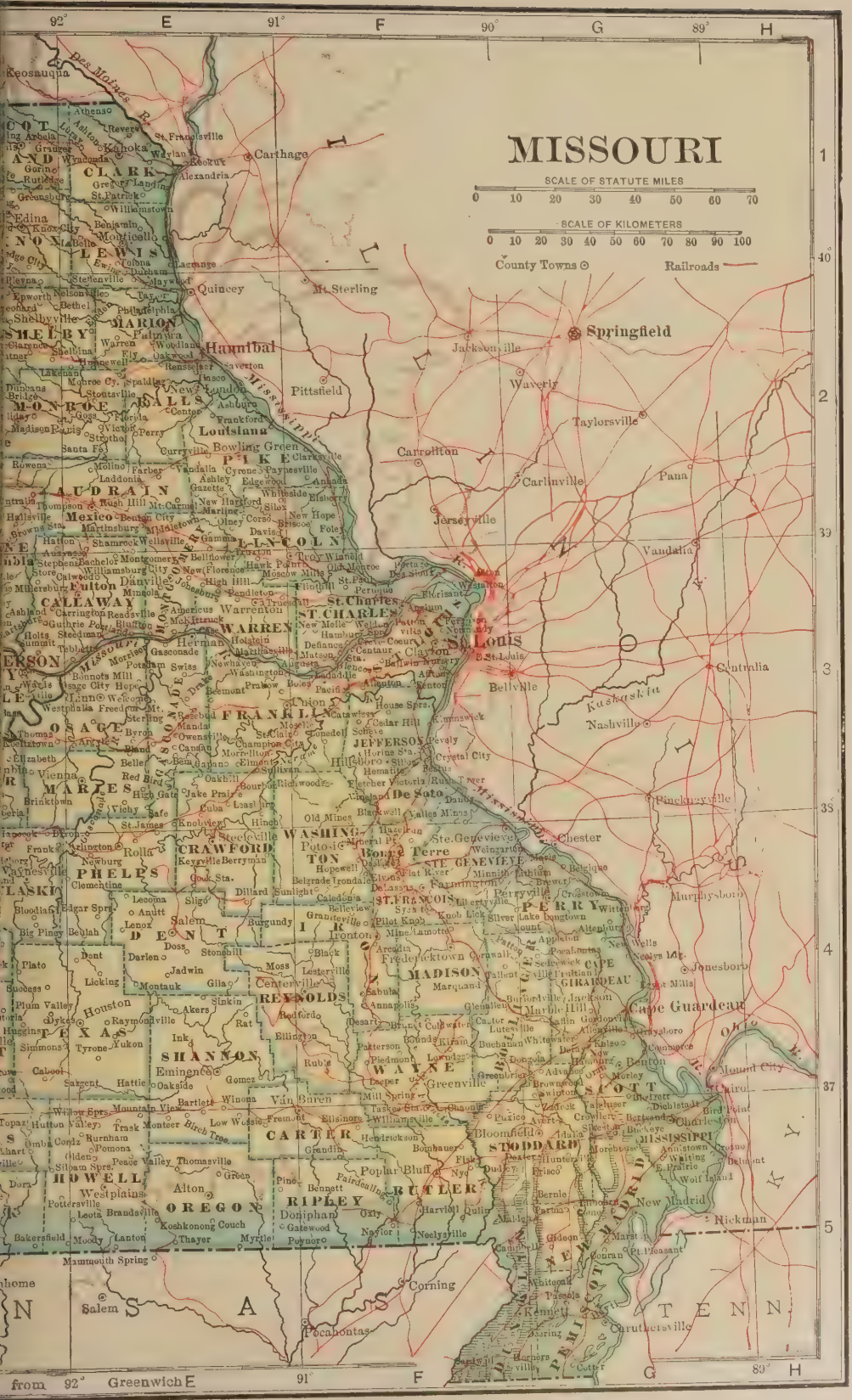
Mount Ayr
Bedford
Corydon
Centerville
Auburn
Falls City
Oregon
Hiawatha
Holton
Topeka
Lawrence
Leavenworth
Oskaloosa
Kansas City
Olathe
Lyndon
Ottawa
Waverly
Garnett
Mound City
Blue Mound
Iola
Fort Scott
Chanute
Erie
Girard
Independence
Oswego
Columbus
Joplin
Miami
Neosho
Seneca
Baxter Springs
Pittsburg
Columbus
Weir City
Cherokee
Girard
Arma
Frontenac
Fort Scott
Uniontown
Bronaugh
Nevada
Stockton
Bolivar
Springfield
Carthage
Aurora
Neosho
Seneca
Joplin
Pineville
Bentonville
Eureka Springs
Green Forest
Harrison
Yellville
Mountain Home
Cassville
Monett
Mt. Vernon
Lebanon
Marshfield
Ozark
Galena
Forsyth
Taneyville
Bradleyville
Hollister
Branson
Kirbyville
Protem
Cedar Valley
Golden
Eldridge
Lockwood
Dadeville
Greenfield
Walnut Grove
Fair Grove
Marshfield
Strafford
Northview
Duncan
Ash Grove
Everton
Pearl
Osceola
Spring
Pomona
Koshkonong
Thomasville
Willow Springs
Mansfield
Norwood
Hartville
Seymour
Cedarville
Gainesville
Theodosia
Isabella
Ava
Dora
Hardenville
Caulfield
Vanzant
Squires
Mountain View
Peace Valley
Pomona
Brandsville
Pottersville
Alton
Thayer


MISSOURI
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100
County Towns
Railroads
Springfield
Hannibal
Quincey
Mt. Sterling
Pittsfield
Carthage
Jacksonville
Waverly
Taylorsville
Carrollton
Carlinville
Pana
Jerseyville
Vandalia
Louisiana
Bowling Green
Mexico
Fulton
Danville
Warrenton
St. Charles
St. Louis
Centralia
Bellville
Nashville
Union
Hermann
Washington
Pacific
Chester
Pinckneyville
Murphysboro
Jonesboro
Cape Guardeau
Mound City
Cairo
Bloomfield
Greenville
Poplar Bluff
Corning
Pocahontas
Carrutherstville
New Madrid
Rickman
Caruthersville
Kaskaskia
Mississippi
Ohio R.
Missouri R.
Iron Mts.
Pilot Knob
Ste. Genevieve
Fredericktown
Marquand
Centerville
Ellington
Patterson
Piedmont
Mill Spring
Williamsville
Fremont
Ellsinore
Van Buren
Eminence
Oakside
Salem
Alton
Thomasville
Mammoth Spring
Bakersfield
Pottersville
Westplains
Willow Spgs.
Mountain View
Trask
Monteer
Birch Tree
Low Wassie
Bartlett
Winona
Hendrickson
Grandin
Bernie
Parma
Gideon
Marst
Pt. Pleasant
Wolf Island
Dorena
Whitewater
Tiosola
Kennett
Senath
Harrisburg
Cotter
Greenwich
92°
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they have a relatively wide range. The rocks of the Ozark region are predominantly limestones. The small area of the St. Francis Mountains is underlaid by igneous rocks consisting of granites and fine-grained eruptives mainly acidic. At one point, the extreme summit of Pilot Knob in Iron County, there is an area of slates, conglomerates, and iron ores that may be Algonkian in age. At a few points and in small areas sandstones occur among the predominant limestones in the Ozark plateau. The Ozark limestones are almost invariably cherty. The rocks underlying the prairie region are predominantly shales, interbedded with limestone and sandstone beds, all of Paleozoic age. The coastal-plain rocks, only partially consolidated, consist of shales, clays, and sands, presumably of Tertiary age. The unconsolidated rock material of the State is of Glacial age north of the Missouri River, of recent but undetermined age south of the same stream, and of recent age in the valleys. The glacial material is predominantly a sandy clay with a layer of silty material overlying it, the origin of which is yet undetermined. The unconsolidated material in the prairie region south of the Missouri consists mainly of clays and silts derived from the decay of rock in places similar to those on which it lies. In the Ozark region it consists mainly of red clay and silt filled with fragments of stone, mainly chert. The alluvial material ranges from clay to sand.

Climate. Missouri lies in the milder half of the warm temperate zone. Being far inland, the State is subject to the extremes of a continental climate, which are all the more accentuated by the fact that it is in the path of frequent cyclonic storms. The average January temperature ranges from 35° F. in the southeastern to 20° F. in the northwest corner. For July the temperature is 80° F. in the extreme south and 75° F. in the extreme north. The average date of the last killing frost in spring is about the middle of April, though it may occur as late as the middle of May. The average date of the first killing frost in the fall is about the middle of October, though it may occur as early as September 25. The average length of the growing season is about 180 days, with a minimum of about 130 days. The different parts of the State do not differ widely in these respects, though the southeastern lowlands are considerably milder than the rest of the State. In summer the mercury sometimes rises to 105° F., while the anticyclones of winter carry the minimum of 10° below to the southern border and 20° below to St. Louis, thus giving that city an annual range of 125°. The southeastern extremity of the State has not a day in the year with the average temperature below freezing, but the record rises rapidly northward, there being 30 such days in Springfield, 60 at Jefferson City, and 90 at Rockport. The summers are pleasantly tempered in the Ozark plateau.

The rainfall ranges from 35 inches per year in the north to 50 inches at the Arkansas line. While this is well distributed through the year, there is a marked minimum in the winter season and maximum in the summer season. Droughts lasting 30 days sometimes occur. Snow falls on the average to the depth of 20 inches in the latitude of St. Louis and less than 10 inches at the Arkansas line, though it rapidly disappears and seldom covers the ground many days. The average relative humidity for the year is less than 70 per cent over the whole State. The prevailing winds are west and northwest in January and south in July. There are on the average 30 thunderstorms in the year, with a maximum frequency in June.

Soils. The soils vary with the underlying character of the rock, the topography, and the drainage. In the Ozark region they are gray, brown, or red in color, rarely black, and are well drained in both soil and subsoil. The texture of the fine material is usually fine grained, silt loams predominating in the soils and silty clays in the subsoil. They are rather stony, and occur, as a rule, on a rolling to rather rough topography, the stone content being predominantly chert. The gray soils are usually deficient in lime while the red soils and the subsoils carry a fair amount. In the prairie region the soils are rather light in color in the eastern part, becoming darker westward and northward. They are, as a rule, somewhat heavier than the Ozark soils, are practically stone free, have good surface drainage except on flat areas, and have a moderate lime content except the soils on the flat areas in the eastern part. The subsoils, except the Missouri River belt, are heavier than the soils. In most of the prairie region the soils are dark enough to be called black. In the southern part, the soils are mostly alluvial and, like these soils in all other parts, are fertile. They are predominately brown in color and range from clays to sands in texture.

Large areas need artificial drainage, and this is rapidly being furnished. The soils in Crowly and Benton ridges are brown silt and clay loams, much like the river bluff soils farther north.

Vegetation. See *Forest Products*, below.

Mining. The principal mineral products of Missouri are spelter (zinc) and lead, in which it ranks first among the States. It leads in the production of barytes and tripoli and ranks second in the production of mineral paints. The combined value of spelter and lead represents about 60 per cent of the entire mineral output of the State. From 40 to 45 per cent of both the spelter and the lead produced in the United States comes from Missouri. The lead ores of Missouri carry very little silver, and the lead produced is known as "soft lead." The principal lead-producing counties are St. François and Madison. The southeast Missouri lead region has made the greatest gains in production of all the lead-producing districts of the United States and since 1908 has annually exceeded the production of the Cœur d'Alene region in Idaho, which formerly held first rank. The ore of the southeast Missouri region is almost wholly lead ore, although, particularly in the southern portion, there are in many places considerable copper, nickel, and cobalt mixed with the lead. The total output of lead concentrates in 1913 was 255,723 short tons, valued at $11,444,935. The recoverable lead content of Missouri ores amounted to 176,116 short tons, valued at $15,498,208. Nearly all the production of sphalerite ores is in the Joplin district, in southwestern Missouri. The recoverable zinc content of the ores produced in 1913 amounted to 124,963 short tons of metal, valued at $13,995,856. The mining of coal ranks third among the mineral industries. Missouri was the first State west of the Mississippi River to enter this field, and in 1840 produced 9772 short tons.

The industry, however, has shown little progress as compared with neighboring States, owing to the competition of the oil and gas fields of Kansas and Oklahoma and the more cheaply mined coal of Illinois and other States. The coal-producing area lies entirely north and west of a line drawn from the northeastern to the southwestern corner. The coal production in 1913 was 4,318,125 short tons, valued at $7,468,308. The occurrence of coal in Missouri appears to have been known as early as 1806, when it was noted by Zebulon M. Pike on the banks of the Osage River. Clay products are fourth in value of the mining industries. While ranking seventh among the States in the total value of its clay products, it ranks second in the manufacture of fire brick. The chief centre of this industry is the immediate vicinity of St. Louis. The refractory brick made in Missouri are of especially high grade, and the average price of its fire brick is higher than that of any other State with the exception of New Jersey. The total value of clay products in 1913 was $6,602,076. Portland cement is another of Missouri's important mineral products. In 1913 the production amounted to 4,485,820 barrels, valued at $4,556,822. Cement plants are located near St. Louis and Kansas City and also at Hannibal and Cape Girardeau. The quarry products, chiefly limestone, were valued at about $2,538,699. A comparatively large quantity of lime is produced. This in 1913 amounted to 161,770 short tons, valued at $734,009. Sand and gravel are also important mineral products. Other mineral products are copper, occasional gems, iron ore, mineral waters, natural gas, pyrite, and silver. The total value of the mineral products in 1913 was $54,001,088.

Agriculture. Of an approximate land area of 43,985,280 acres in 1910, 34,591,248 acres were in farms, of which there numbered 277,244. The improved land in farms amounted to 24,581,186 acres, or 56 per cent of the total area. The average acres per farm were 124.8 in 1910, and the total value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, was $2,052,917,488. The average value of all farm property was $7405 in 1910, and the average value of land per acre $41.80, an increase per farm of $21.34 over 1900. Of the total number of farms in 1910, 194,286 were operated by owners and managers. There were, in 1910, 259,111 native white farmers, 14,467 foreign-born white, and 3666 negro and other nonwhite. Of the foreign-born white farmers 8453 were born in Germany.

The following table shows the acreage, production, and value of some of the principal crops in 1914. The figures are estimates of the United States Department of Agriculture.

PRODUCTS	Acreage	Prod. bu.	Value
Corn	7,200,000	158,400,000	$107,712,000
Wheat	2,549,000	43,333,000	42,466,000
Oats	1,200,000	25,800,000	11,352,000
Rye	17,000	238,000	207,000
Potatoes	87,000	3,915,000	2,858,000
Hay	2,600,000	*1,820,000	24,752,000
Tobacco	4,100	†4,920,000	640,000
Cotton	122,000	‡75,000	2,336,000

*Tons. † Pounds. ‡ Bales.

The total value of crops in 1909 was $220,664,000 and the combined acreage was 14,335,588, representing 58.3 per cent of the total improved land in farms. The general character of agriculture is indicated by the fact that about two-thirds of the total value of crops in 1909 was contributed by cereals and 15.3 per cent by hay and forage. The remainder consisted chiefly of potatoes and other vegetables, forest products, and fruits and nuts. The leading crops in 1909 in order of their importance as judged by value were corn, hay and forage, wheat, oats, potatoes, and cotton. Corn, the most important crop, had an acreage of 7,113,953 in 1909. The production was 191,427,007 bushels, valued at $107,347,033. Hay and forage had an output valued at $33,845,000, the acreage being 3,628,348. In that year wheat, the third important crop, had an acreage of 2,017,128 and an output valued at $29,926,000. The acreage of cotton in 1909 was 96,527, from which were produced 54,498 bales, valued at $3,392,440. The total acreage of potatoes and other vegetables in 1909 was 233,767 and their value $13,305,829. Excluding potatoes and sweet potatoes and yams, the acreage of vegetables was 129,570 and their value $8,268,000.

The production of orchard fruits, chiefly of apples, is an important agricultural industry. The total quantity grown in 1909 was 11,957,399 bushels, valued at $6,582,578. Of the total production apples contributed 9,968,977 bushels, with a value of $4,885,544. Other important orchard fruits are peaches and nectarines, pears, plums, prunes, and cherries. The production of grapes in 1909 was 17,871,816 pounds, valued at $488,765. Of small fruits the most important is the strawberry, of which 15,171,034 quarts, valued at $1,122,784, were grown in 1909. The total production of small fruits was 23,696,221 quarts, valued at $1,761,409. Sorghum cane is produced in important quantities. This in 1909 amounted to 201,206 tons, and from it were made 1,788,391 gallons of sirup, valued at $876,970. Tobacco is an important product in some portions of the State. In 1909, 5433 acres were planted to tobacco, and the production was 5,372,738 pounds, valued at $636,479.

Live Stock and Dairy Products.—The total value of domestic animals of all kinds on the farms in 1909 was $273,366,662. Missouri has always been noted for the quantity and value of its mules. On Jan. 1, 1915, it was estimated that there were 1,414,000 cattle other than milch cows, valued at $53,591,000; milch cows numbered 747,000, valued at $43,436,000; horses, 1,095,000, valued at $96,360,000; mules, 329,000, valued at $32,242,000; sheep, 1,490,000, valued at $7,450,000; swine, 4,250,000, valued at $34,425,000. The total value of milk, cream, and butter fat sold and butter and cheese made in 1909 was $13,685,318. There were sold 15,733,185 gallons of milk and 14,646,771 pounds of butter. The total number of fowls of all kinds in 1910 was 20,897,208, valued at $11,870,972.

Forest Products. The timber lands north of the Missouri River are restricted mostly to the river valleys, while the Ozark region south is normally a forest area of largely mixed hardwoods, thinning out westward. The forest area in 1908 was 28,600 square miles, or 42 per cent of the total. The logging and milling operations are confined largely to the wooded Ozark region of southern Missouri, while many of the planing mills and box factories are located in the larger cities. With the exception of the boot and shoe factories the

lumber industry gives employment to more persons than any other industry. The fertility of the soil gives the hardwoods a decided advantage over evergreens in most parts of the State. There is only one pine (short-leaf, *Pinus echinata*), and that is chiefly confined to the Ozark region. One other evergreen, the cedar, is widely distributed over the State, but not very abundant, and cypress, a deciduous conifer, is found in considerable quantities in the alluvial bottoms in the southeast. The remainder of the forest is made up of hardwoods. The thirteenth census reports 2076 saw mills in Missouri, with the following production of lumber, lath, and shingles for 1909, in M feet, B. M.: *Conifers*—pine, 142,271; cypress, 32,891; cedar, 2984. *Hardwoods*—oak, 271,623; red gum, 83,905; hickory, 33,259; elm, 27,913; cottonwood, 17,987; ash, 12,685; sycamore, 10,526; maple, 10,376; tupelo gum, 4351; walnut, 4314; yellow poplar, 1791; birch, 1115; basswood, 1990; all others, 1078. Total, 660,159 M feet, valued at $10,041,472. The total value of manufactured products in 1909 was $23,261,000. In addition to the figures above there were produced on the farms of the State in 1909 forest products valued at $8,406,823.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — TEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries	1909	8,375	185,705	152,993	$444,343	$80,843	$574,111	$219,700
	1904	6,464	156,585	133,167	379,369	66,644	439,549	187,291
Boots and shoes, including cut stock and findings	1909	59	18,665	17,396	15,838	8,164	48,751	14,211
	1904	37	10,949	10,451	8,290	4,349	23,541	8,588
Bread and other bakery products	1909	954	6,797	4,743	17,043	2,487	18,524	7,695
	1904	614	4,962	3,764	7,416	1,816	12,672	5,391
Clothing, men's, including shirts	1909	84	8,667	7,994	8,109	2,994	15,407	6,336
	1904	73	6,500	6,070	5,037	2,098	10,329	4,786
Coffee and spice, roasting and grinding	1909	40	1,376	730	5,273	342	12,062	2,870
	1904	26	960	554	3,129	268	7,264	2,119
Flour-mill and gristmill products	1909	680	3,602	2,198	17,066	1,040	44,508	5,682
	1904	582	3,555	2,345	14,834	1,091	38,026	5,098
Foundry and machine-shop products	1909	329	9,051	7,443	20,870	4,860	19,975	10,819
	1904	256	8,331	7,155	14,102	4,274	14,692	8,619
Liquors, malt	1909	31	6,348	5,646	44,662	3,908	27,447	19,879
	1904	50	6,202	5,568	43,620	3,408	24,154	17,902
Lumber and timber products	1909	1,098	15,814	13,522	18,930	5,897	23,261	12,647
	1904	495	14,057	12,664	13,688	5,542	18,349	11,932
Printing and publishing	1909	1,322	15,792	10,790	21,998	6,610	29,651	21,024
	1904	1,253	13,912	9,757	16,358	5,330	24,412	17,611
Slaughtering and meat packing	1909	45	5,529	4,674	18,787	2,673	79,581	7,383
	1904	38	4,862	4,236	16,449	2,381	60,110	6,011

Manufactures. Missouri's prominent industrial position is due largely to the activity of the industries of St. Louis and Kansas City. It ranked well in manufactures as early as 1849, in which year it was tenth in value of products. In 1909 it held the same relative position. In that year the gross value of products per capita was $174. Its abundant mineral supply has resulted in the development of such industries as smelting and refining copper, lead, and zinc, marble and stone work, iron and steel blast furnaces, kaolin and ground earths, glass, and paints. Extensive timber areas have provided abundant material for the development of the lumber and timber industries. The location of the cities in the midst of a great agricultural region and their proximity and access to raw materials, as well as their excellent shipping facilities, are factors favorable to the growth of their manufacturing industries.

The table below gives the most important figures relative to the 10 leading industries in 1909 and 1904.

The most important industry is that connected with slaughtering and meat packing. Missouri is located in the centre of a hog-raising area; it is one of the great corn-growing States and has extensive feeding and grazing areas for cattle in the prairies of the north and for sheep in the Ozarks of the south. These features have been very important factors in the development of this industry. The total number of hogs slaughtered in 1909 was 2,471,658, valued at $36,911,941. In addition there were 530,356 beeves slaughtered, valued at $24,332,919; 81,551 calves, valued at $821,829; and 546,649 sheep, valued at $2,659,215. The manufacture of boots and shoes, which was second in importance in 1909, measured by value of product, has shown a remarkable development. As a result of this pronounced growth Missouri became second in the industry in 1909. The industry gave employment to more wage earners than any other in 1909, and is not confined to the larger cities, but exists in many small cities and towns. In 1909, 24,657,160 pairs of boots and shoes were made. The manufacture of flour-mill and gristmill products occupied third place in value of products in 1909. Most of the mills are small and are located in the rural districts, but there are several very large mills in the cities. There were produced, in 1909, 5,661,379 barrels of white flour, valued at $29,995,104. The manufactures of graham flour, corn meal and corn flour, and feed are also important. One of the distinctive industries of the State is the manufacture of smoking pipes. The world's supply of corncob pipes is manufactured largely in Missouri.

There was in 1909 an average of 152,993 wage earners, of whom 122,266 were males. The wage earners 16 years of age and under numbered 3818, of whom 2286 were males. For

nearly three-fourths of the wage earners employed the prevailing hours of labor range from 54 to 60 a week. The most important manufacturing city is St. Louis. There were in this city, in 1909, 87,371 wage earners, and the value of its manufactured products was $328,495,313. St. Louis (q.v.) held in 1909 fourth place in the value of manufactured products among the cities of the United States and third place in the manufacture of boots and shoes. All of the tanneries, the baking-powder establishments, and practically all of the soap works of the State are located here. There were in Kansas City (q.v.), in 1909, 14,643 wage earners, and the value of its manufactured products was $54,704,510. St. Joseph (q.v.), the third city in manufacturing rank, had, in 1909, 5390 wage earners and a product valued at $17,625,682.

Transportation. Missouri is one of the leading States in mileage of navigable rivers. It is also well equipped with transportation facilities by land. The northern half is covered by a network of railroads. In the southern half, however, the mileage is small and a number of counties have no railroad communication. The northern half has the advantage of lying in the course of some of the great transcontinental lines and is less broken than the southern part. St. Louis, Kansas City, and St. Joseph on the western border are large railroad centres. The railway mileage was 8153 in 1913. The chief lines are the Missouri Pacific, the Atchison, Topeka, and Santa Fe, the St. Louis and San Francisco, the Kansas City Southern, the Chicago, Burlington, and Quincy, the Chicago and Alton, the Wabash, and the Missouri, Kansas, and Texas. Railroad rates are in charge of the Board of Railroad Commissioners, who hear and determine complaints against the railroads, but their decision is subject to revision by the courts. There is a large amount of water traffic between St. Louis, the terminal for the larger steamers, and the Gulf. Competition of the railroads, however, is tending to decrease this. The grain and animal produce of the West reaches its market in great part by way of Missouri. The mileage of electric railways in 1912 was 852. The total number of companies operating electric roads in that year was 19.

Banks. The Bank of St. Louis, chartered in 1813 and opened in 1816, was the first in the State. It went into liquidation in 1819. Next came the Bank of Missouri, which opened in St. Louis in 1817 and failed in 1822. This left the State without any chartered banks until 1829, when the United States Bank opened a branch in St. Louis. The branch was discontinued in 1833. The Bank of the State of Missouri, chartered in 1837, was a large institution with five branches in the State and was a bank both of issue and of discount. For 20 years it had almost a monopoly of the banking business, but its circulation was insufficient and in 1857 seven more banks of issue were chartered. Many more followed. All were forced to conform to the law which allowed the issue of only three dollars for every dollar specie. The law of 1857 provided also for a bank commissioner, who should visit and examine the various institutions. This office was soon abolished and there sprang up a number of small speculative banks, all of which collapsed in the panic of 1873. The system of national banking extended very slowly, but the largest institutions sooner or later became the national banks. In 1868 the St. Louis Clearing House Association was organized with 35 members. Trust companies were first formed in 1889 and became very popular. There always have been many banks bearing the word "savings" in their titles, but none of them conformed to the general plan of a savings bank. In September, 1914, there were 130 national banks, with an aggregate capital of $35,570,000. Their combined surplus was $15,986,118; cash, etc., $7,832,484; loans, $306,486,630; and deposits, $143,165,947. The State banks on June 30, 1914, numbered 1250. Their combined capital was $34,845,350; surplus, $18,552,198; cash, etc., $11,245,644; loans, $208,877,432; and deposits, $207,570,909. Bank clearings at St. Louis in 1914 amounted to $4,051,000,000 and at Kansas City to $3,015,810,567. In 1914 Federal Reserve Banks were located at these cities.

Government. The present constitution, which has been amended in important details, was adopted in 1875. Amendments must be passed by a majority of the members of each House of the General Assembly, after which they are submitted separately to the people at the next general election. The General Assembly may also at any time authorize a vote of the people to be taken upon the question whether a constitutional convention shall be held.

Legislative.—The legislative power is vested in a Senate and a House of Representatives, called the General Assembly. The House of Representatives consists of members chosen every second year, who are apportioned according to the population of the counties. A representative must have attained the age of 24 years and have been a qualified voter for at least two years. The Senate consists of 34 members, chosen from districts of approximately equal population. Senators must be at least 30 years of age and qualified voters for three years. The initiative and referendum were adopted by a constitutional amendment in 1908.

Executive.—The executive department consists of a Governor, Lieutenant Governor, Secretary of State, State Treasurer, State Auditor, Attorney-General, and Superintendent of Public Schools, all of whom, except the Lieutenant Governor, must reside at the seat of government during their term of office. The supreme executive power is vested in the Governor. He must be at least 35 years of age at the time of his election, have been a citizen of the United States 10 years and a resident of the State seven years next before his election. The Governor and Treasurer are ineligible for reëlection. The term of all the executive officers is four years.

Judiciary.—The judicial power is vested in a supreme court, courts of appeals, circuit courts, and others of minor importance. The supreme court consists of seven judges and is divided into two divisions. The courts of appeals consist each of three judges who are elected by the qualified voters of the appellate district for a term of four years. Separate and district courts exist in each county, presided over by a circuit judge, although his circuits may comprise several counties. Judges of the circuit court are elected and hold offices for terms of six years. Each county has a probate court and a county court.

Suffrage and Elections.—Persons qualified to vote are males over 21 years of age who are

citizens of the United States or who have declared their intention of becoming such not less than one year nor more than five years preceding the election and who have resided in the county 60 days immediately previous to the day of election. General elections in the State are held biennially on the Tuesday next following the first Monday in November, dating from 1876. All elections must be by ballot. The Legislature of 1913 made important changes in the general election and primary laws. These amendments were embraced in 10 separate acts, the most important relating to primary elections. There is a stringent corrupt-practices act.

Local and Municipal Government.—The General Assembly has no power to establish any new county with a territory of less than 410 square miles. Municipalities are not permitted to subscribe to the capital stock nor aid corporations or institutions. Townships may be organized whenever a majority of the legal voters of the county shall so determine. Cities having a population of more than 100,000 may form a charter for their own government. These charters must provide for a mayor or chief magistrate, and two houses of legislation, one of which at least shall be elected by a general ticket. Provision is also made for adoption by cities and towns of a commission form of government.

Other Constitutional and Statutory Provisions.—Imprisonment for debt is not permitted. Corporations cannot be created by special laws. Railroad companies may not charge for the transportation of freight or passengers a greater amount for a less distance than the amount charged for any greater distance. There is a blue-sky law, patterned after the Kansas statute. There is a white-slave act, conforming in its essential features to the Mann Act. The State is under local-option law, which permits the liquor question to be settled by a vote of the people in each county, excepting only from its operation cities containing a population of 2500 or more and permitting these to vote as separate units.

Finance. Missouri's first public debt was acquired in 1835, when it bought stock in the banks of the State. This amounted to $1,397,000. Quite unlike many other States, it was not involved in financial difficulties due to its banking enterprises and was free from extensive debt up to 1850. Then began the era of speculative railroad construction, and within the next eight years many railroads were chartered, receiving from the State loans in the shape of guaranteed bonds amounting to about $24,000,000. The railroads failed to pay the interest, and the State had to assume the entire debt, which amounted to $27,370,000 in 1862. The debt remained above $20,000,000 until 1880, but has been reduced, and in 1915 it was $7,308,339. This is divided among the State school fund ($3,159,000), the State seminary fund ($1,239,839), and the capitol building fund ($2,909,500). For the year ending Dec. 31, 1914, the total receipts were $10,540,264, the disbursements were $9,618,813, and the balance in the Treasury was $4,942,011.

Militia. The males of militia age in the State in 1910 numbered 721,866. The organized militia in 1914 consisted of a division of infantry, including the first, second and third, fourth and sixth regiments, a cavalry troop, two field artillery troops, a signal troop, and sanitary troop.

The strength of enlisted men was 3320 and of officers 256.

Population. The population at different periods is as follows: 1810, 20,845; 1820, 66,586; 1840, 383,702; 1850, 682,044; 1860, 1,182,012; 1870, 1,721,295; 1880, 2,168,380; 1890, 2,679,184; 1900, 3,106,665; 1910, 3,293,335. The estimated population on July 1, 1914, was 3,372,886; 1920, 3,404,055. In 1910 Missouri ranked seventh in population. The white population was 3,134,932 in 1910. The foreign-born white population was 228,896, and the negro population, which is confined largely to the Missouri and Mississippi River counties, was 157,452. Of the foreign-born white the most numerous are Germans, followed by Irish, Russians, Italians, and Austrians. St. Louis was an early centre of German immigration, and the Germans still constitute over one-half of the total foreign-born population of that city.

Of the total population in 1910, 67.4 per cent were born in the State. Of the remainder 5.6 per cent were born in Illinois, 2.3 per cent in Kentucky, 2 per cent in Kansas, 2 per cent in Ohio, 1.9 per cent in Indiana, 1.8 per cent in Tennessee, 1.7 per cent in Iowa, nearly 1 per cent in Pennsylvania, less than 1 per cent in each of the other States, and 6.9 per cent in foreign countries. The population in places of 2500 or more in 1910 was 1,398,817. The rural population was 1,894,513. In 1910 there was an average of 47.9 persons per square mile, a greater density than is shown in any other State west of the Mississippi. There were, in 1910, 15 cities with a population of 8000 or over. The largest city, St. Louis, had in 1910 a population of 687,029 and in 1914 an estimated population of 734,667. Kansas City had in 1910 a population of 248,381 and in 1914 an estimated population of 281,911. Other large cities with their populations in 1910 are: St. Joseph, 77,403; Springfield, 35,201; Joplin, 32,073; Hannibal, 18,341.

Education. Educational problems of Missouri are in general those of other Southern States which have a large rural population. Persistent efforts have resulted in material improvement of conditions. The percentage of illiteracy among all classes was 4.3 in 1910, the number of illiterate persons of 10 years of age or over being 111,116. The percentage of illiteracy among native whites of native parentage was 3.4, among native whites of foreign or mixed parentage 1.2, among foreign-born whites 10.1, and among negroes 17.4. The improved condition of the colored population as regards illiteracy is particularly encouraging. In 1890, 41.7 per cent of the colored population was illiterate. According to the thirteenth census the total school population, ages 6 to 20 years, in 1910 was 993,998. Of these, 646,868 attended school in that year. The total school population of native parentage was 798,833, and the negro school population was 41,682. According to the report of the State Superintendent of Education the total school population in 1913 was 954,699, the total enrollment 690,484, and the average daily attendance 494,309. Female teachers numbered 14,148 and male 4706. The average salary of male teachers was $497.60 per year and of female teachers $484.44. On June 1, 1914, there were 165 first-class high schools, 55 second-class, and 141 third-class, making a total of 361 approved schools.

The General Assembly of 1909 provided county supervision of schools and a compulsory eight months' term in each school district. In 1911 a

teachers' certificate law was passed and provisions made for the transportation of pupils.

Agriculture is taught in the high schools. The total enrollment in the high schools in 1913 was 42,266. The average length of the school term in 1913 was 160 days. The estimated value of the school property for sites and buildings was $41,829,767 and for school equipment $3,605,681. The total expenditure for educational purposes in 1913 was $16,402,780. There are normal schools at Cape Girardeau, Kirksville, Warrensburg, Springfield, and Maryville. Washington University is at St. Louis, the University of Missouri at Columbia, Missouri Wesleyan College at Cameron, Christian University at Canton, Central College at Fayette, Pritchett College at Glasgow, Missouri Valley College at Marshall, Scarritt-Morrisville College at Morrisville, Park College at Parkville, Drury College at Springfield, Tarkio College at Tarkio, and Central Wesleyan College at Warrenton. These are all coeducational. Colleges for men exclusively are Westminster College at Fulton, William Jewell College at Liberty, St. Louis University at St. Louis, and Christian Brothers College at St. Louis. The last two are Roman Catholic institutions. Colleges for women are Stephens College at Columbia, Howard-Payne College at Fayette, Synodical College at Fulton, Central College for Women at Lexington, Lexington College for Young Women at Lexington, Hardin College at Mexico, Cottey College at Nevada, Lindenwood Female College at St. Charles, and Forest Park University at St. Louis. Special schools include the State School for the Deaf at Fulton, Missouri School for the Blind at St. Louis, Missouri Training School for Boys at Boonville, and Missouri Training School for Girls at Chillicothe.

Charities and Corrections. The charitable and correctional institutions are under the control of the State Board of Charities and Corrections. This board, in addition to its other duties, serves as a bureau of information for those seeking knowledge of social questions. It employs a secretary, who devotes all his time to the study of social work and acts as an official agent for the board. The charitable and correctional institutions under the supervision of this board include hospitals at Fulton, St. Joseph, Nevada, and Farmington, the Industrial School for Girls at Chillicothe, Training School for Boys at Boonville, Colony for Feeble-Minded and Epileptic at Marshall, Missouri School for the Deaf at Fulton, Missouri School for the Blind at St. Louis, Federal Soldiers Home at St. James, Confederate Soldiers Home at Higginsville, State Sanatorium at Mount Vernon, and State Penitentiary at Jefferson City. Prior to 1911 convicts were employed under contract, although their work was confined to the prisons. In some of the counties male prisoners within the county jails were worked on the public roads or at quarrying stone. In the year mentioned a measure was passed forbidding the farming out or selling of convict labor. Convicts are allowed to work in the binding-twine plant and in manufacturing supplies for State institutions. These cannot be purchased elsewhere if they can be supplied by convict labor. The same Legislature passed a measure permitting counties with a population of 250,000 to 500,000 which have a juvenile court to appropriate not more than $12,000 a year for the support of mothers of children under 14, who are widows or whose husbands are prisoners and who would otherwise have to work away from their children. The only city to which this applies is Kansas City. Cities of 500,000 or more inhabitants are permitted to create a board of children's guardians to manage public institutions of the city for delinquent, dependent, or defective children. In counties with a population of 50,000 or more juvenile courts for children under 17 are established.

Religion. The two leading denominations, the Methodist and the Baptist, are of almost equal strength. The Roman Catholics also have a strong representation. Probably the most rapidly developing denomination is that of the Disciples of Christ. It ranks third among Protestant denominations. The largest of the remaining denominations are the Presbyterians, Lutherans, Protestant Episcopalians, and Congregationalists.

History. Missouri was part of the vast area of Louisiana claimed by the French on the ground of the discoveries of La Salle, who descended the Mississippi to its mouth in 1681–82. A few years before La Salle, in 1673, Marquette and Joliet had sailed down the river as far as the mouth of the Arkansas. The territory included within the present State was traversed before 1720 by parties of French explorers in search of mines of lead and silver, and in 1723 a certain Lieutenant Renaud received the grant of a large tract of land in that region. The foundation of St. Genevieve is sometimes placed in the year 1735. The second settlement within the State was St. Louis, established as a trading post in 1764, a year after the cession of Louisiana to Spain by the Peace of Paris. Many French residents removed from the villages east of the Mississippi to St. Louis, which became, under the French and the Spanish, a prosperous little capital. The colonization of the region was greatly accelerated by the Ordinance of 1787, which, in excluding slavery from the Northwest Territory, diverted the stream of southern immigration to Missouri. The Spaniards also encouraged immigration by the offer of liberal bounties to settlers. In 1800 Louisiana was retroceded to France, which, however, retained it only three years. After the acquisition of Louisiana by the United States, in 1803, the entire territory was divided in two by the line of the thirty-third parallel of latitude, the northern part being known as the District and Territory of Louisiana till 1812, and subsequently as the Territory of Missouri. At that time the population was over 20,000, and the chief occupations of the inhabitants were agriculture, fur trading, and mining. The mass of the people were sturdy and unrefined; the rough backwoodsman and the fighting Mississippi River boatman were picturesque types of the society of the period. After 1815 immigration increased markedly. In 1820 there were 66,000 inhabitants within the present limits of the State, of whom about 10,000 were slaves. The Indian titles to the land were extinguished rapidly. Between 1800 and 1824 the Osages and Sacs and Foxes ceded almost all their lands, though it was not till 1837 that the area of the State was rounded out by the so-called Platte Purchase.

In 1817 the Territorial Legislature applied to Congress for permission to prepare a State constitution. (For the struggle in Congress concerning Missouri, see UNITED STATES and

MISSOURI COMPROMISE.) In June, 1820, a convention framed a constitution which sanctioned slavery and forbade any free negro or mulatto to take up his residence in the State; but Missouri was admitted (Aug. 10, 1821) only after the Legislature had taken a pledge that the antifreedmen clause should never be enforced. The period after 1820 was one of rapid, if not entirely sound, development. An era of wild speculation in lands set in, accompanied by the usual inflation of the currency (the Bank of St. Louis had been established in 1816) and the inception of an elaborate system of internal improvements. Within 20 years after 1835 the State pledged its credit for $28,000,000 to various railroad companies and found itself saddled with a debt of over $20,000,000. The system of public education was quite inefficient before the Civil War, though St. Louis University had been incorporated in 1832 and the State University at Columbia eight years later. Respect for the law was often sadly wanting in the western part of the State, as was shown in the history of the Mormons. They had settled at Independence in Jackson County and had made the beginning of a prosperous community, when they were driven out by mob violence, for which it is probable they were less responsible than their enemies. They established themselves anew in Caldwell County; but there, too, they came into conflict with the authorities and the inhabitants, who forced them to depart once more in a destitute condition, leaving valuable farms and other property behind them. See MORMONS.

In the first half of the nineteenth century Missouri, though a slave State, was not an ardent defender of slavery, and a very large proportion of its citizens were interested in movements looking towards the gradual emancipation of the slaves. With the rise of the Abolitionists, however, Missouri became decidedly a proslavery State. It favored the annexation of Texas in 1845 and took a very prominent share in the Mexican War, General Kearny's army of invasion consisting largely of Missourians. In 1849 the Legislature adopted the so-called Jackson resolutions, in which the right of Congress to regulate slavery in the Territories was trenchantly denied, and the principle of squatter sovereignty was asserted. The Jackson resolutions, however, did not represent the unanimous feeling in the State when they covertly threatened secession. In the election of 1860 the vote in the State for Douglas and for Bell was nearly equal, while Breckenridge and Lincoln received a far smaller vote than the others. The Legislature thereupon issued a call for a convention to consider the relation of the State to the Union. In the elections for the convention the secessionist delegates were defeated by a popular majority of 80,000, and when the convention met—February to April, 1861—it declared that it could find no cause to dissolve the connection between the State and the Federal Union, and expressed the hope that some compromise might be effected between the North and the South. In reply to President Lincoln's call for troops, Governor Jackson, who, with the rest of the State government, was in favor of secession, refused to participate in the "unholy crusade" and summoned the State militia to arms. Between the State militia and the Federal troops, under Colonel Lyon, aided by the volunteer bands which the loyalists of St. Louis had organized, civil war ensued. The Governor, together with a majority of the Legislature, fled to the southern part of the State, and the supreme power was assumed by the convention which declared all the offices vacant and proceeded to install a provisional government. The fugitive Legislature responded by declaring Missouri a member of the Southern Confederacy. (For military operations in Missouri, see CIVIL WAR IN AMERICA.) In 1863 the convention passed an ordinance of emancipation of doubtful legality, to go into effect in 1870. With the fall of the Confederate power in Missouri the regular State government was reorganized (1864), and in January, 1865, a constitutional convention controlled by the radical union party assembled in St. Louis. The new constitution provided for the immediate emancipation of the slaves and imposed severe political disabilities on all who had participated in the Rebellion; all teachers, physicians, lawyers, and ministers were required to take a searching oath of loyalty. The qualifications for the franchise deprived a vast proportion of the citizens of the right to vote and continued in force till 1871, when a more liberal registration law was adopted. A third constitution went into effect in 1875.

From 1824 to the Civil War Missouri was always Democratic. From 1864 to 1872 the Republicans were in power, but the defection of a large body of Liberal Republicans who were opposed to the policy pursued against those who had participated in the Rebellion led to the reëstablishment of Democratic supremacy. In 1894, however, the Republicans secured a majority in the Legislature and the congressional delegation. In 1904 Roosevelt carried the State. In 1905 Joseph W. Folk (Democrat), who had become a national figure, from his successful exposure and conviction of corrupt city officials in St. Louis, was elected Governor, although in the same year the Republican national ticket carried the State by 25,000 plurality. The Legislature of 1907 passed many severe measures for the regulation of railroads and corporations; these resulted in much litigation in the succeeding years. (See RAILWAYS and STATE RIGHTS.) In 1908, as a result of a suit brought by Attorney-General Herbert S. Hadley, the Standard Oil Company of Indiana and the Republic Oil Company of New York were forbidden to do business in the State. In the elections of that year Mr. Hadley defeated the Democratic candidate, William H. Cowherd, for Governor, and William J. Stone was nominated for the United States Senate. The carrying of the State by the Republicans in the presidential election was one of the surprises of the campaign of 1908. Taft received 347,202 votes, Bryan 246,574. In January, 1909, the United States Supreme Court upheld the decision of the State courts against the Standard Oil Company of Indiana and its subsidiary companies. Missouri took a conspicuous part in the political campaign of 1912. The leading candidate for the Democratic nomination put at the head of the national convention was Champ Clark, one of the State's Representatives in Congress and Speaker of the House. Governor Hadley was one of the foremost Progressive leaders in the Republican preconvention campaign and was one of the seven governors who signed a letter urging Mr. Roosevelt to be a candidate during

the first days of the convention. He was leader of the Republican forces. With the nomination of Mr. Taft, however, Governor Hadley did not join the movement for a new party, but gave his support to President Taft. At the election on November 5, Wilson received 339,497 votes, Taft 207,491, and Roosevelt 123,111. Elliott W. Major, Democrat, was elected Governor. A senatorial election was held in 1914 in which Senator Stone was reëlected. The most notable feature of this election was the falling off of the Progressive vote, which was reduced from 327,371 in 1912 to 27,614 in 1914. The following is a list of the Governors of the State:

Alexander McNair	Democrat	1820–24
Frederick Bates	"	1824–25
Abraham J. Williams (acting)	"	1825
John Miller	"	1825–32
Daniel Dunklin	"	1832–36
Lilburn W. Boggs	"	1836–40
Thomas Reynolds	"	1840–44
M. M. Marmaduke (acting)	"	1844
John C. Edwards	"	1844–48
Austin A. King	"	1848–52
Sterling Price	"	1852–56
Trusten Polk	"	1856–57
Hancock Jackson	"	1857
Robert M. Stewart	"	1857–61
Claiborne F. Jackson	"	1861
Hamilton R. Gamble	(Provisional)	1861–64
Willard P. Hall (acting)		1864–65
Thomas C. Fletcher	Republican	1865–69
Joseph W. McClurg	"	1869–71
B. Gratz Brown. Liberal Republican and Democrat		1871–73
Silas Woodson " " " "		1873–75
Charles H. Hardin	Democrat	1875–77
John S. Phelps	"	1877–81
Thomas T. Crittenden	"	1881–85
John S. Marmaduke	"	1885–87
A. P. Morehouse	"	1887–89
David R. Francis	"	1889–93
William J. Stone	"	1893–97
Lon V. Stephens	"	1897–1901
Alexander M. Dockery	"	1901–05
Joseph W. Folk	"	1905–09
Herbert S. Hadley	Republican	1909–13
Elliott W. Major	Democrat	1913–17
F. D. Gardner	"	1917–21
Arthur M. Hyde	Republican	1921–

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MISSOURI, mĭ-sōō′rĭ *or* mĭ-zōō′rĭ. A small tribe of Siouan stock. When first known to the whites they occupied the territory about Grand River, a northern affluent of the Missouri, in what is now the State of Missouri, and contiguous to the Iowa and Oto (q.v.) on the north and west, all three tribes speaking the same language. Their popular name is of Algonquian origin, and is said to mean "great muddy," referring to the Missouri River. They call themselves *Niutachi* or *Nudacha*, "those who come to the mouth" (of the river). The Missouri are named upon Marquette's map of 1673, and some years afterward a French fort was established in their territory. In 1725 a number of their chiefs visited France and attracted much attention. At one time in the eighteenth century they were estimated at from 1000 to 1200; but, after being greatly reduced by smallpox, they were attacked by the Sauk, who compelled them to abandon their territory about 1798 and take refuge west of the Missouri. In 1805 they were living near the mouth of the Platte River and numbered about 300. In 1823 they were again so decimated by smallpox that the remnant, about 80 persons, incorporated with the kindred Oto.

MISSOURI, UNIVERSITY OF. A State institution for higher education, founded in 1839 at Columbia, Mo. It is coeducational. The university in 1915 was organized into 11 divisions: the colleges of arts and sciences, and agriculture, including an experiment station; schools of commerce, education, engineering, including an experiment station, journalism, law, medicine, mines and metallurgy; graduate school, and the extension division. The school of journalism was founded in 1906 and the school of commerce in 1914. These divisions, with the exception of the school of mines and metallurgy, which is located at Rolla, are at Columbia. For admission to the division of arts and agriculture four years' high-school work is required, while for admission to professional schools there are required two years of college work or its equivalent. The master's degree is conferred in the graduate school and the bachelor's degrees in the colleges of arts and sciences and agriculture, schools of commerce, education, journalism, law, and mines and metallurgy; the degrees of M.E. in mines and metallurgy, and C.E., E.E., M.E., and Ch.E. in engineering. The honorary degree of doctor of laws is also conferred. The enrollment in all the departments in 1914–15 was 3816. This includes the enrollment in the summer schools. The faculty numbered 186, including 84 assistants. The campus at Columbia contained about 70 acres, and the university owns a farm containing nearly 800 acres. The campus at Rolla contains 27 acres. The total value of the grounds, buildings, and equipment at the end of the collegiate year 1913–14 was $3,646,010. The endowment was $1,505,339. The university is supported largely by State and Federal appropriations. The library contains nearly 200,000 volumes and 100,000 pamphlets. The president in 1915 was Albert R. Hill, LL.D.

MISSOURI COMPROMISE. In American history, an arrangement between the free and slave States, embodied chiefly in an Act of Congress approved March 6, 1820, which provided for the admission of the State of Missouri into the Union with a constitution which allowed slavery, but which forever prohibited slavery in all the rest of the Louisiana territory lying north of lat. 36° 30′ N., that being the southern boundary line of Missouri. To balance the admission of Missouri as a slave State, Maine was admitted as a free State at the same time. In February, 1819, in the debate in Congress on the bill to admit Missouri into the Union, James W. Tallmadge, of New York, moved to amend the Missouri bill to the effect "that the further introduction of slavery or involuntary servitude be prohibited, and that all children of slaves born within the State after the admission thereof in the Union shall be free at the age of 25." The admission of Alabama in the same year without any prohibition against slavery made

the number of "slave" States and of "free" States equal. The admission of Missouri as a "free" State, therefore, would disturb the equilibrium. The bill with the Tallmadge amendment passed the House Feb. 7, 1819, by a vote of 87 to 76. On March 2 the Senate passed the bill without the Tallmadge amendment. Two days later Congress adjourned and the question of Missouri went over to the next session. In December, 1819, another bill for the admission of Missouri was introduced, whereupon John W. Taylor, of New York, on Jan. 26, 1820, offered an amendment in the House which provided that as a condition of admission the State should be required to adopt a constitution forever prohibiting slavery within its limits. This gave rise to a prolonged and vigorous debate on the power of Congress to impose conditions upon the admission of a State into the Union. Those who upheld the power of Congress in the premises based their argument on the provision of the Constitution which empowers Congress to admit new States, the implication being that it may admit under any conditions which it may see fit to impose. Their opponents relied chiefly upon the doctrine of the equality of the States in the Federal system, and declared that Congress had no constitutional power to destroy that equality by attaching onerous conditions to admission of the new States. Meantime the situation was complicated by the application of Maine to be admitted with a constitution prohibiting slavery. The House of Representatives promptly passed a bill for this purpose, and when this bill came up for discussion in the Senate in January, 1820, the friends of slavery in Missouri, who were in a majority in the Senate, coupled the Maine bill with the bill to admit Missouri with slavery, and the Senate steadily refused to disconnect the two measures. In this situation the substance of the compromise was proposed by Senator Thomas, of Illinois, in an amendment which provided that Missouri should be admitted with a constitution allowing slavery, but that in all the rest of the Louisiana territory north of lat. 36° 30′ N. slavery or involuntary servitude should be forever prohibited. The bill with this amendment finally passed the Senate, Feb. 18, 1820, by a vote of 34 to 10. The bill thus amended was coupled with the bill to admit Maine, and in this shape was sent to the House for concurrence. The House refused to agree to the combination, and the matter was then referred to a conference committee of the two Houses, which recommended that the Maine bill be passed separately, and that the Missouri bill should be passed with the Thomas amendment. To this report the House agreed. The separation of bills as distinct subjects was thus secured, and recognition was given to the claim of the Southerners that Congress had no power to impose such limitations as it saw fit upon any State as a condition of its admission to the Union. President Monroe approved the Maine bill on March 3, and the Missouri bill on March 6, 1820. Henry Clay, who was Speaker of the House, exerted his influence to bring about this result, and for his work in these compromises was called the "Pacificator." In the next session the constitution of Missouri, including a paragraph making it the duty of the Legislature to prevent the immigration of free negroes into the State, was presented to Congress for approval. This provoked a heated debate concerning the duty of the Federal government to protect the citizens of each State in the exercise of their civil rights of citizenship in every other State. After protracted negotiation, a bill was finally introduced providing that Missouri should be considered admitted as a State only after its Legislature had declared that no law would ever be passed, nor any construction placed upon the obnoxious paragraph which would justify any law which might abridge within Missouri the rights guaranteed to all citizens by the Federal Constitution. The bill involving this second compromise was approved March 2, 1821, and in accordance with its terms Missouri became a Commonwealth. The compromise of 1820 was important as the first precedent for the congressional exclusion of slavery from public territory, and also as a clear recognition that Congress had no right to impose upon a State asking for admission into the Union conditions which do not apply to those States already in the Union. "The Missouri Compromise was the work of moderate men, chiefly those who lived in the Middle States and in the northern tier of Southern States." The Missouri Compromise was specifically repealed by the Kansas-Nebraska Bill of 1854, and was pronounced unconstitutional and void by the famous Dred Scott decision.

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MISSOURI RIVER. The principal affluent of the Mississippi and the longest river of the United States (Map: United States, G 2). It is formed in southwest Montana by the confluence of the Jefferson, Madison, and Gallatin rivers, which unite at Gallatin City, Mont., at an elevation of 4032 feet above sea level. The longest branch, the Jefferson, has its farthest source in Red Rock Creek, which rises on the slopes of the Red Rock Range of the Rocky Mountains, on the border between Montana and Idaho, west of the central portion of Yellowstone Park. The Madison and Gallatin rivers rise within the Yellowstone Park near the source of the Yellowstone River. From the junction of the three forks the Missouri flows north and east across Montana into North Dakota. Here it is joined by its largest affluent, the Yellowstone River, which at the point it empties into the Missouri is about 800 yards wide. From this place the Missouri describes a long curve towards the southeast and then crosses the whole width of South Dakota. After reaching the Nebraska boundary it divides this State from Iowa and Missouri, forms the northeast boundary of Kansas, and finally takes an easterly course across Missouri, joining the Mississippi River 3 miles below Alton, Ill., and 20 miles above St. Louis. Its length to the source of the Jefferson is about 2950 miles and to the source of the Madison about 2910 miles. With the lower Mississippi the river has a total length

of about 4200 miles, which is equaled by no other river in the world. The Missouri is a swift and turbid stream, navigable only by flat-bottomed steamboats. In the flood period in early summer it can be ascended nearly to Great Falls, Mont., about 2300 miles from the mouth, but during low water, which occurs in summer and early autumn, navigation is suspended above the junction of the Yellowstone. At Great Falls the Missouri passes over a series of cataracts, descending a vertical distance of 350 feet in 16 miles. The highest falls are 87 feet. About 145 miles above this point is the Gate of the Rocky Mountains, a narrow rock gorge 5 miles in length, whose perpendicular walls rise 1200 feet above the river. The lower course of the Missouri, lying within the great plains, has been graded so as to offer no interruptions. In this part it is often a mile or more wide. The chief tributaries are the Milk and Yellowstone, in Montana; Little Missouri, in North Dakota; Cheyenne, James, White, and Big Sioux, in South Dakota; Niobrara and Platte, in Nebraska; Kansas and Osage, in Kansas and Missouri. It drains the greater part of the territory between the Mississippi and the summits of the Rocky Mountains. The Arkansas and Red rivers are the only other large streams in this region that contribute their waters directly to the Mississippi. The area of the basin drained by the Missouri is about 600,000 square miles, and the average quantity of water discharged by the Missouri in a second is about 120,000 cubic feet. A number of thriving cities are located on the Missouri, including Kansas City, Leavenworth, Atchison, Omaha, Sioux City, Pierre, Bismarck, and Great Falls, the last being the centre of a great copper-smelting industry which utilizes the power of the falls.

MISSOURI SUCKER, or GOURDSEED. See BLACK HORSE, and Plate of SUCKERS.

MISSOURI VALLEY. A city in Harrison Co., Iowa, 21 miles north of Council Bluffs, on the Chicago and Northwestern Railroad (Map: Iowa, B 3). It has a Carnegie library, and the fair grounds of the county agricultural society. The industrial interests are represented by extensive railroad machine shops, stockyards, grain elevators, and manufactories of flour, machine-shop products, bricks, tiles, cement blocks, and creamery products. Fruit growing and stock raising are carried on in the vicinity. The water works are owned and operated by the municipality. Pop., 1900, 4010; 1910, 3187.

MIST. See FOG; HAZE.

MISTAKE'. In law, an erroneous mental conception affecting the will or intention and hence leading to an unintended act or preventing a contemplated result. The importance of the mistake in legal contemplation is its effect upon the act. In general a mistake of law produces no legal effect upon an act influenced or induced by it. Thus, one is without remedy who has entered into a contract without knowing or understanding its legal effect, or who has voluntarily and with full knowledge of the facts paid a claim not well founded in law. The full acceptance of the doctrine is due to a misapplication of the maxim, *Ignorantia juris non excusat* (Ignorance of the law is no excuse), which is applicable only in the criminal law or under statutes imposing quasi-criminal penalties where sound policy requires that ignorance of law should not excuse one charged with a crime. (See INTENT.) Mistake of fact has a direct legal effect on many acts, and the law in many cases affords a remedy to one who has done a prejudicial act induced by mistake of fact.

The effect of mutual mistake as to a material term of a contract is to prevent the meeting of the minds and thus prevent the formation of a contract (q.v.). The effect of mutual mistake of fact in case of sale is to prevent passing of title, and one who has given up the possession of personal property under mistake, preventing the passing of title, may recover the specific property by an appropriate action, or its value in an action of trover. In general, whenever money or property is delivered to another under material mistake of fact, its value may be recovered in an action based on the theory of quasi contract (q.v.).

In the law of tort the effect of mistake of fact varies considerably with the different branches of the subject. In the law of trespass one is required to know his own, and he interferes with the property of another at his peril.

Equity has jurisdiction to relieve one from the consequences of his mistake of fact, by compelling a re-formation or rescission of a contract.

Consult Kerr, *A Treatise on the Law of Fraud and Mistake* (3d ed., London, 1902).

MISTASSINI, mĭs'tăs-sē'nê. A large lake near the north boundary of the Province of Quebec, lat. 50° N., long. 72° to 74° W. (Map: Canada, Q 6). In 1672 French Jesuit missionaries visited it. The Indians claimed an extravagant length for the lake, saying that three days were employed in crossing the narrowest part from island to island, but an estimate based on surveys gives the length at 120 miles and the actual width at 20 miles in the widest parts. From the northeast and southeast it receives the drainage of a chain of smaller lakes, and discharges its own surplus into James Bay, the southern arm of Hudson Bay, by the Rupert River, 120 miles long. The Hudson's Bay Company has a post on Lake Mistassini, 333 miles north of Montreal. The lake is of great depth and abounds in fish; the surrounding country is level and well fitted for agriculture, while the woods are full of game. The winters are clear and cold and the summers warm and short.

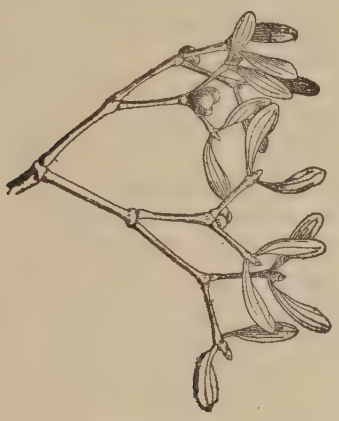
MISTEC. See MIXTEC.

MISTELI, mĭs-tā'lê, FRANZ JOSEF (1841–1903). A Swiss philologist. He was born at Solothurn; studied at Zurich and Bonn; taught at Saint-Gall and Solothurn; and in 1874 became professor of comparative linguistics at Basel. A follower of Steinthal, whose *Characteristik der hauptsächlichsten Typen des Sprachbaues* he reedited in 1893, Misteli contributed to Kuhn's *Zeitschrift* and to the *Zeitschrift für Völkerpsychologie*, and wrote *Ueber griechische Betonung* (1875) and *Erläuterungen zur allgemeinen Theorie der griechischen Betonung* (1875). He was an authority on the dialects of the Ural and Altai.

MISTLE (mĭs'l) **THRUSH,** or **MISSEL THRUSH.** One of the most familiar and admired of European thrushes (*Turdus viscivorus*), named from its fondness for mistletoe berries, which are rejected by the majority of small birds. It is the largest and one of the most numerous of British thrushes, and is also well known throughout the Mediterranean region and western and northern Asia. Everywhere it is migratory, and is noted for its loud and pleasant song, which begins first of all bird notes in the spring and lasts far into the sum-

mer; its habit of cheerfully singing on cold or rainy days, when most other birds are quiet, has given it the sobriquet "stormcock." Its plumage is soft grayish brown above and white below, the breast and abdomen thickly and sharply spotted. See THRUSH.

MISTLETOE, mĭs″l-tō (AS. *misteltān, mistiltān,* Icel. *mistilteinn,* from AS. *mistel,* birdlime, mistletoe, basil, Icel., OHG. *mistil,* Ger. *Mistel,* mistletoe + AS. *tān,* twig). A genus (*Viscum*) of small shrubs of the family Loranthaceæ. This family contains more than 500 known species, mostly tropical and parasitic. The leaves are entire, almost nerveless, thick, fleshy, and without stipules. The flowers of many species are showy. The European mistletoe (*Viscum album*), a native of the greater part of Europe, grows on many kinds of trees, particularly on the apple, and its close relatives, the service and hawthorn; sometimes, also, on sycamores, limes, poplars, locust trees, and firs, but rarely on oaks (contrary to the common belief). It is very plentiful in some parts of the south of England, its evergreen leaves giving a peculiar appearance to the orchards in winter, when the clusters of mistletoe are very conspicuous among the naked branches of the trees. The stems divide by forking; the leaves are opposite, of a yellowish-green color, obovate-lanceolate, obtuse. The flowers are inconspicuous, and grow in small heads at the ends and in the divisions of the branches, the male and female flowers on separate plants. The berries are about the size of currants, white, translucent, and full of a very viscid juice, which serves to attach the seeds to branches, where they germinate, and take root, the radicle always turning towards the branch, whether on its upper or under side. The mistletoe derives its nourishment only partly from the juices of the tree on which it grows, and from which it seems to spring as if it were one of its own branches. The green coloring matter, chlorophyll, permits the parasite to elaborate its food. The mistletoe was intimately connected with many of the superstitions of the ancient Germans and the British Druids. In the northern mythology, Balder is said to have been slain with a spear of mistletoe. Among the Celts the mistletoe which grew on the oak was in peculiar esteem for magical virtues. Traces of the ancient regard for the mistletoe still remain in some old English and German customs, as kissing under the mistletoe at Christmas. The mistletoe was at one time in high repute as a remedy for epilepsy and convulsions, but it seems to possess no decided medicinal properties. *Loranthus europæus,* a shrub very similar to the mistletoe, but with flowers in racemes, is plentiful in some parts of the south of Europe, and very frequently grows on oaks. *Loranthus odoratus,* a Nepalese species, has very fragrant flowers. In the United States the mistletoe is *Phoradendron,* a genus of plants closely allied to and greatly resembling *Viscum.* The common species in the Eastern States is *Phoradendron flavescens.* It occurs upon various species of hardwood trees from New Jersey to Missouri and southward and is used for Christmas decorations like the European one. In the southwestern part of the United States and in California are still other species. *Arcenthobium pusillum,* or *Razoumofskya pusilla* is a leafless mistletoe about an inch long, parasitic on spruce and tamarack trees from Maine to Michigan. A larger species of the same genus grows in the Northwest. See Colored Plate of PARASITIC PLANTS.



VISCUM ALBUM.

MISTLETOE BOUGH, THE. A pathetic song by Thomas Haynes Bayly, based on a legend connected with various localities.

MISTRAL, mē′strål′, or **MAESTRAL,** mā′strål′ (Prov., master wind). The Provençal name for the cold northwest wind on the southern coast of France and in other parts of the Mediterranean coast region. This wind is identical in origin with the bora (q.v.) of the Caspian Sea and of Austria, Turkey, and southern Russia. It is also perfectly analogous to the strong northwest winds of the United States. In both cases the atmosphere over a great extent of country is circulating about a region of low pressure or a so-called storm centre, moving along over the surface of the earth usually towards the east or northeast. When such a storm centre passes over southern Europe, the cold winds from Russia sweep southward with great force towards it. The warm southerly siroccos give place to cold northerly boras and mistrals, which are very dry; the cloudy hazy skies are replaced by cloudless transparent air. During the first few hours the wind seems to come in descending and violent gusts; afterward it becomes more moderate, but is still very strong. When it descends over mountain slopes upon the water, as it does along the coast of France, Italy, and Austria, it makes navigation difficult and even dangerous to small craft.

MISTRAL, FRÉDÉRIC (1830–1914). A French poet, the leader of the modern Provençal revival in southern France. He was born at Maillane, Bouches-du-Rhône, Sept. 8, 1830, and went to school in Avignon. Here he came under the influence of Joseph Roumanille (q.v.), who had already conceived the idea of raising the native speech to higher uses. Roumanille's Provençal poem *Li Margarideto* fired the youth's enthusiasm, and when he returned to Maillane, at the end of his school days, he wrote a poem in four cantos, *Li Meissoun,* the best parts of which he has preserved by insertion into his riper works. His father, seeing his intellectual superiority, had him study law at Aix. Mistral, however, did not practice law, but gave himself up heart and soul to the work of creating a literature in Provençal. With six friends he founded the society of the Félibres in 1854 and contributed to their annual organ *L'Armana Prouvençau.* The publication in 1859 of *Mirèio* is the most important

event in Mistral's life and in the history of the movement. It was a revelation to the Félibres, and through the enthusiastic praise of Lamartine it obtained a national success. *Mirèio* is a narrative pastoral poem in twelve cantos, a wonderful expression of what is most characteristic and best in the rural life of Provence. The language is the dialect of Saint-Remy, raised to the dignity of a literary language by a process of purification and enrichment strictly in accord with its genius. At this time also Mistral published some of his best lyrical poems, notably one called *The Countess*, a vigorous protest against the centralization prevailing in France. In 1867 he published a second long poem, *Calendau* (French, *Calendal*); it treats of mediæval legends and traditions, and abounds in symbolism. In 1875 appeared his only volume of lyrics, *Lis Isclo d'or*. In 1876 the Félibrige (q.v.) was formally organized into a great association with Mistral as *Capoulié* or chief. He next published *Nerto*, a fantastical tale in verse. Later he brought out his monumental dictionary of all the dialects of the *Langue d'oc, Lou tresor dou Félibrige*. In 1890 appeared *La Rèino Jano* (Queen Joanna), which he called a Provençal tragedy. It is brilliant in language, but of little dramatic power. In the same year he founded the quarterly *L'Aiòli*. In 1897 appeared a third long narrative poem, *Lou pouèmo dou rose*, his best work after *Mirèio*. It is a felicitous combination of fanciful legends and realism. In 1904, with Echegaray, Mistral was awarded the Nobel prize for literature. He published in 1906 *Mes origines, mémoires et récits*, in 1910 he made a Provençal translation of Genesis, *La Genèsi traducho en provençau*, and in 1913 appeared his *Oulivado*, a collection of lyric poetry written at different times in his life. The best English translation of *Mirèio* is that of Harriet Preston (Boston, 1872); it appears also in Warner's *Library of the World's Best Literature*. There are prose translations in French by Mistral of all his works. He died March 25, 1914. Consult: Gaston Paris, *Penseurs et poètes* (Paris, 1896); Welter, *Frédéric Mistral, der Dichter der Provence* (Marburg, 1899); C. A. Downer, *Frédéric Mistral, Poet and Leader in Provence* (New York, 1901); *Memoirs of Mistral*, rendered into English by C. E. Maud: Lyrics from the Provençal by Alma Strettel (London, 1907).

MISTRETTA, mē-strĕt'tȧ. A town in the Province of Messina, Sicily, 50 miles northwest of Catania (Map: Italy, E 6). It is situated in one of the most fertile sections of the island, 3200 feet above the sea and but a short distance from it. The chief industries are farming and cattle raising. Lignite is mined in the vicinity. Pop. (commune), 1901, 13,481; 1911, 13,608.

MISTRI'AL. In law, an invalid or illegal trial of an action, the result of which is without legal effect on the cause of action, and which leaves the parties in the same position as if there had been no trial of the case. A mistrial may result from a variety of causes, as a defective plea, the failure of the parties to form a triable issue, the incompetence of the judge to act in a given case, the drawing of a jury from the wrong county, the withdrawal or death of a juror, or any other event which affects the legal validity of the proceedings. Where the prosecution of a person charged with a crime results in a mistrial the accused may be again tried, and cannot plead the constitutional defense that he has been twice in jeopardy, as that plea is valid only where the proceedings are legal and the issue is tried to a conclusion. See NONSUIT; TRIAL.

MITANI, mē-tä'nē. See AMARNA LETTERS; CUNEIFORM INSCRIPTIONS.

MITANNIANS. The name of a people living in Mesopotamia in the second millennium B.C. Our knowledge concerning them is derived chiefly from the Tel el Amarna and Boghaz Keui tablets. The Mitannians seem to have belonged to the Hittites in the wider sense of this term, but were apparently distinct from the Hatti, or Hittites, whose capital was at Boghaz Keui in the days of Subbiluliuma and his successors. (See HITTITES.) Among the leading kings of the Mitannians who are known to us were Saushshatar, Artatama I, Sutarna I, Tushratta, Artatama II, Artashshumara, Mattuaza, and Sutarna II. Tushratta was a contemporary of Subbiluliuma, and father-in-law of Amenhotep III of Egypt (1411–1389 B.C.). His three predecessors consequently reigned during the fifteenth century. This dynasty, however, does not seem to have belonged to the native Mitannian race, but to the Harri, an Aryan people, as their worship of Mitra, Varuna, Indra, and the Nashatya indicates. Winckler has suggested that these Harri first took possession of Armenia and then imposed their authority on the Mitannians. The Mitannians themselves may have been the Hittites (Hatti) who in 1932 B.C. made an end to the Amoritish dynasty of Babylon. (See BABYLONIA.) In the weakness of Assyria following Samsi Adad II (c.1870–1840) they established themselves in Mesopotamia, and the new dynasty of the Harri was able to take possession of Assyria itself, or at any rate the territory around Nineveh, so that Tushratta could send Ishtar of Nineveh to Amenhotep III in his last illness. It was evidently by an alliance with Egypt that Tushratta was able to maintain his independence of the great King of Hatti, while it is not improbable that another independent Harrian kingdom existed north of his realm adjoining the Arzawa in Armenia. As to the ethnic relations of the native Mitannians, their language seems to point to a kinship, not only with the Hittites in Asia Minor, but also with other Asianic and Caucasian peoples. Among the letters of Tushratta in the Tel el Amarna collection one is written in the Mitannian language, though in cuneiform characters. It is a square tablet whose longest side is 3 feet in length, containing two columns of text on each side, each of which has 100 lines. This letter is now in Berlin, and it was first published by Winckler in *Mitteilungen aus den k. Museen zu Berlin* (Berlin, 1890). Attempts at interpreting it were made by Brünnow, Sayce, Jensen, and Messerschmidt, but the most exhaustive study of its language has been made by Bork, who compares it throughout with the Georgian, Mingrelian, and other Caucasian tongues, and also with the Chaldian (see CHALDIANS) and the Elamitish (see ELAM), finding no similarities between it and the Aryan, Semitic, or Ural-Altaic languages. It has been plausibly conjectured that the name Mitani occurs in the bilingual inscription on the so-called Tarkondemos boss, showing that both Hittite hieroglyphics and cuneiform script were used among the Mitannians. In the religion of this people Teshub, Nergal as sun god, and Ishara, corresponding to Ishtar, seem to have been the chief deities. Aryan divinities, possibly at that time

Iranian, were introduced by the Harri; and the worship of Akkadian, Assyrian, and Amoritish gods no doubt flourished among the Mitannians.

Bibliography. The editions of the Tel el Amarna tablets by Winckler and Knudtzon; Brünnow, Sayce, and Jensen in *Zeitschrift für Assyriologie* (Leipzig, 1890–91); Messerschmidt, "Hettiter," in *Der alte Orient* (ib., 1903); Ferdinand Bork, "Mitanninamen aus Nippur," in *Orientalistische Literatur-Zeitung* (Berlin, 1906); Winckler, in *Mitteilungen der deutschen Orientgesellschaft* (ib., 1907); M. A. S. Oppenheim, "Der Tell Halaf und die verschleierte Göttin," in *Der alte Orient* (Leipzig, 1908); Ferdinand Bork, *Die Mitannisprache* (Berlin, 1909); Winckler, *Vorderasien im zweiten Jahrtausend* (Leipzig, 1913).

MITAU, mē'tou. The capital of the Government of Courland, Russia, situated in a flat and fertile district on the left bank of the navigable Semgaller Aa, 25 miles southwest of Riga (Map: Russia, B 3). It has an immense palace erected by Biron in 1738 on the site of an older ducal palace, used as a government building. Two Gymnasia, a provincial museum with a library, and a theatre are the principal educational establishments of the town. The industries of Mitau are unimportant; the chief manufactures are flour, chocolate, oilcloth, ink, and iron products. The trade in grain and lumber is rather extensive. Pop., 1897, 35,011; 1913, 39,200, consisting of Germans (95,000), Jews (6500), Letts (6000), Russians, and Poles. The majority of the inhabitants are Protestants, and the town is the seat of a General Superintendent of the Lutheran church. The castle of Mitau was founded by the Knights Sword Bearers in the second half of the thirteenth century, and became a city in 1435. In 1561 it became the capital of the Duchy of Courland and in 1795 it was annexed to Russia. In 1812 it was occupied by the French and Prussians.

MITCH'AM. An important railway junction and suburb of London, England, on the river Wandle, in Surrey, 4 miles northwest of Croydon (Map: London, G 6). It is noted for its extensive gardens, the soil of which is especially adapted for the cultivation of roses, lavender, peppermint, and other medicinal herbs, from which an excellent quality of essential oil is extracted. Mitcham Common, covering 480 acres, is a favorite recreation ground for golfers. Pop., 1901, 14,904; 1911, 29,606.

MITCH'EL, John (1815–75). An Irish Nationalist agitator. He was born at Camnish, County Londonderry, Ireland; was educated at Trinity College, Dublin; and studied and practiced law. Through his *Life of Hugh O'Neil, Prince of Ulster* (1845), he gained a reputation as a writer and a Nationalist. He became a contributor to the Irish *Nation,* and, after the death of Thomas Osborne Davis, was its chief editor. He withdrew from the *Nation* in 1848 and established the *United Irishman.* In the same year he was arrested under the Treason-Felony Act, was convicted and sentenced to transportation for 14 years, and was sent to Bermuda for one year and then to Tasmania. Escaping from the convict colony in 1853, he came to the United States, and in the following year established at New York the *Citizen.* He removed to Knoxville, Tenn., in 1857, started the *Southern Citizen,* and advocated in it the revival of the African slave trade. He lived in Paris in 1860–62, then returned to America, and for a time edited the Richmond *Enquirer,* a semiofficial organ of the Confederate government. He afterward went back to New York and in 1867 started the *Irish Citizen,* which had only a short career, being discontinued in 1872. He visited Ireland in 1872, and in 1875 he was elected to Parliament from Tipperary, but was declared ineligible and denied his seat on the ground that he was a convicted felon. He was elected a second time, but died before his case could be tested. His three sons were all in the Confederate army in the American Civil War. Besides the work already mentioned he published *The Last Conquest of Ireland (perhaps)* (1860) and *History of Ireland from the Treaty of Limerick* (1868); and edited *The Poems of Thomas Osborne Davis* (1856) and of *James C. Mangan* (1859), with biographies. Consult W. Dillon, *John Mitchel* (London, 1888).

MITCHEL, John Purroy (1879–1918). An American mayor, born at Fordham, N. Y. He studied in St. John's College; graduated from Columbia University in 1899 and from the New York Law School in 1901. Admitted to the bar in the latter year, he was special counsel for the city of New York in 1906–07. His rapid rise in politics was due to his success as an investigator and prosecutor of grafters while commissioner of accounts of New York in 1907–09. To this office he had been appointed by his friend, Mayor McClellan. The trial and conviction of the grafters gave Mitchel standing with the good-government advocates of New York, and he was elected on a fusion ticket as president of the board of aldermen for the term 1909–13. Mitchel was acting mayor and demonstrated ability as an executive officer. A Democrat in politics, he was appointed collector of the port of New York by President Wilson in 1913. In that year, also, he became a candidate for the nomination for mayor on the fusion ticket, contesting for the place with District Attorney Whitman. The citizens' committee gave him the nomination, and in the regular election he defeated the Tammany ticket headed by Edward F. McCall. The issue most prominent was Tammany control, which had been sharply criticized because of alleged graft and the Sulzer impeachment. His administration was characterized by careful economies in expenditures, by the establishment of municipal markets, and by his attempts to relieve the unemployment situation in 1914–15.

MITCHEL, Ormsby McKnight (1810–62). An American astronomer, educator, and soldier. He was born in Union Co., Ky., was a clerk for some time in a country store, and graduated at West Point in 1829. From 1829 to 1831 he was assistant professor of mathematics at West Point and in 1832 he resigned from the service. He practiced law in Cincinnati from 1832 to 1834 and for the next 10 years was professor of mathematics, philosophy, and astronomy in the Cincinnati College. In 1836–37 he was chief engineer of the Little Miami Railroad and was consulting engineer to the Ohio and Mississippi Railroad in 1848–53. He was adjutant general of Ohio in 1847. He was an enthusiastic student of astronomy and took an important part in procuring the erection of an observatory in Cincinnati, of which, when it was completed, he became the director, combining with this position in 1859 the directorship of the Dudley Observatory in Albany. On the outbreak of the Civil War he entered the Federal army, was com-

missioned a brigadier general of volunteers in August, 1861, and from September 19 to November 15 commanded the Department of the Ohio. In April, 1862, he was promoted to a major-generalship of volunteers in recognition of a brilliant movement into northern Alabama whereby he secured the control of 120 miles of railway. On Sept. 17, 1862, he was placed in command of the Department of the South, but before he had time to begin active operations he was attacked by yellow fever and died at Beaufort, S. C. He made several important astronomical discoveries, including, with exactness, that of the period of rotation of the planet Mars. He edited the *Sidereal Messenger*, which he founded, from 1846 to 1848, and published a number of works on astronomical subjects, including *The Planetary and Stellar Worlds* (1848); *The Orbs of Heaven* (1851); *Popular Astronomy* (1860), which, with *The Orbs of Heaven*, was reissued at London in 1892. *The Astronomy of the Bible* was published posthumously in 1863. Consult the biography by F. A. Mitchel (Boston, 1887).

MITCHELL. A city in Lawrence Co., Ind., 61 miles northwest of New Albany, on the Baltimore and Ohio Southwestern and the Chicago, Indianapolis, and Louisville railroads (Map: Indiana, E 7). Fruit growing and the manufacture of Portland cement are the chief industries. Of interest in the vicinity are numerous caves, notably Donaldson and Hamer's. The electric-light plant is owned by the city. Pop., 1900, 1772; 1910, 3438.

MITCHELL. A city and the county seat of Davison Co., S. Dak., 72 miles west by north of Sioux Falls, on the Chicago and Northwestern and the Chicago, Milwaukee, and St. Paul railroads and on the James River (Map: South Dakota, F 4). It has Dakota University (Methodist Episcopal), established in 1888, a Carnegie library, city hall, opera house, and St. Joseph Hospital. The city maintains a beautiful corn palace, where a splendid exposition, attracting a large number of visitors, is given each year. The centre of a fertile agricultural region, Mitchell exports grain and live stock; it has a creamery, railroad and machine shops, cigar and candy factories, grain elevators, brick and lumber yards, wholesale fruit houses, etc. Settled in 1879, Mitchell was incorporated in 1883 and is governed under a charter, secured by general legislative act of 1890, which provides for a mayor, elected every two years, and a city council of which the executive is a member. The water works are owned by the municipality. Pop., 1900, 4055; 1910, 6515.

MITCHELL, Alexander (1817–87). An American financier and railroad president, born near Ellon, Aberdeenshire, Scotland. In 1839 he came to the United States at the request of George Smith, a Scotchman who was interested in the development of the West, and was made president of the Wisconsin Marine and Fire Insurance Company, at the new town of Milwaukee. Mitchell settled in Milwaukee, and his name is inseparably connected with the development of that city and region. In 1861, appointed head of the Milwaukee debt commission, he labored effectively to restore the city's impaired credit. In 1864 Mitchell effected a combination of several roads into the Chicago, Milwaukee, and St. Paul Railroad Company, of which he was president from its organization until his death. He was a Republican until after the war, but left the party on the reconstruction issue, in 1868 was elected to Congress as a Democrat, and served until 1875.

MITCHELL, Alexander Ferrier (1822–99). A Scottish divine and scholar, the historian of the Westminster Assembly. He was born at Brechin in Forfarshire, Sept. 10, 1822, and after graduating from the University of St. Andrews he became minister at Dunnichen (1847–48). He resigned to accept the professorship of Hebrew in the University of St. Andrews. In 1868 he was transferred to the chair of ecclesiastical history and divinity. He held some of the highest offices in the Church of Scotland and was an active member of the Scottish Text and History societies. Among his publications are: *The Westminster Confession of Faith* (1866); *Minutes of the General Assembly 1644–49* (1874); *The Westminster Assembly: Its History and Standards* (1883; new ed., 1895); *Catechisms of the Second Reformation* (1886); *Reprint, with Introduction, of the First Protestant Treatise in Scottish Dialect* (1888). He died March 22, 1899.

MITCHELL, Donald Grant (1822–1908). An American author, well known by his pseudonym Ik Marvel. Born in Norwich, Conn., he graduated from Yale College (1841), and for three years worked on a farm near his native town. In 1844 he went to Europe, living for ten years on the island of Jersey, and bringing out on his return *French Gleanings, or a New Sheaf from the Old Fields of Continental Europe* (1847) and in 1849 *The Battle Summer*, sketches reminiscent of the outbreak in Paris two years before. In 1850 he produced *The Lorgnette, or Studies of the Town*, a series of mildly satirical papers in the manner of Irving's *Salmagundi*. The same year and the following year he wrote the books most popularly associated with his pseudonym, *A Bachelor's Reveries* (more recently renamed *Reveries of a Bachelor*) and *Dream Life*. These gained him admission to the American Academy of Arts and Letters. In 1853 Mitchell was appointed United States Consul at Venice. On his return, in 1855, he bought a farm (known as "Edgewood") near New Haven, Conn. There he wrote books dealing, in an agreeable mixture of philosophy, farming, and anecdote, with the joys of country life: *My Farm of Edgewood* (1863); *Wet Days at Edgewood* (1865); *Dr. Johns* (1866), a novel of religious type; *Rural Studies, with Hints for Country Places* (1867); and several books of travel and sketches, such as *Seven Stories, with Basement and Attic* (1864); *English Lands, Letters, and Kings* (4 vols., 1889); *American Lands and Letters* (2 vols., 1898–99). Consult P. E. More, *Shelburne Essays* (5th series, New York, 1908).

MITCHELL, Edward Page (1852–). An American newspaper editor. He was born at Bath, Me., and in 1871 graduated from Bowdoin College, which conferred on him the honorary degree of Litt.D. in 1907. He joined the staff of the Boston *Advertiser* in 1871, but after 1875 was on the editorial staff of the New York *Sun*, of which he became editor in 1911. In 1913 he was a special lecturer at the Columbia School of Journalism. In 1909–11 he was president, and thereafter was vice president, of the Sun Printing and Publishing Company. Mitchell's writing gave the *Sun's* editorial page the reputation of being one of the most brilliant in the country. He contributed stories and sketches to the magazines.

MITCHELL, ELISHA (1793–1857). An American scientist, born at Washington, Conn. He graduated at Yale in 1813 and was ordained into the Presbyterian ministry in 1821. After teaching in Yale he became professor of mathematics and natural philosophy at the University of North Carolina in 1817, and in 1825 professor of chemistry, mineralogy, and geology at the same institution. In the capacity of State surveyor he ascended a number of the North Carolina mountains, and was finally killed by a fall from a precipice on a mountain which he had just ascertained to be the highest in the United States east of the Rockies. On this summit, called Mount Mitchell (see BLACK MOUNTAINS), the discoverer's body is buried. His works include a series of reports on the geology of North Carolina (1826–27); *Elements of Geology, with an Outline of the Geology of North Carolina* (1842); and various articles which he contributed to scientific publications.

MITCHELL, HENRY (1830–1902). An American hydraulic engineer, brother of Maria Mitchell. He was born in Nantucket, was educated in private schools, and early devoted himself to the study of tides and river currents, being first employed by the United States Coast Survey to report on the waters about Nantucket and Marthas Vineyard. After assisting the commissioners on harbor encroachments in New York City and discovering the underflow of the Hudson (1859), Mitchell was consulting engineer to the United States Commission on Boston Harbor (1860–67) and member of the commission; in 1867 was sent to study the decline of Greytown harbor, Nicaragua; and in 1874 was appointed a member of the board of engineers to improve the mouth of the Mississippi. In 1879 he visited the Suez Canal and reported on it. Mitchell was elected to the National Academy of Sciences in 1885 and in 1888 retired from active business. His papers on physical hydrology mostly appeared in the United States Coast Survey Reports.

MITCHELL, HINCKLEY GILBERT (1846–). An American theologian, born at Lee, N. Y. He graduated at Wesleyan University (1873) and at the Divinity School of Boston University (1876), and after studying at Leipzig, preached in the Methodist Episcopal church at Fayette, N. Y. (1879–80); taught at Wesleyan (1880–83); and thereafter until 1905 was professor of Hebrew and Old Testament exegesis at Boston University. For denying the historicity of the early chapters of Genesis he was refused confirmation by the Board of Bishops of the Methodist Episcopal Church in 1905. From 1906 to 1910 he was engaged in exegetical studies, and then became professor of Hebrew and Old Testament exegesis at Tufts College. He was director of the American School for Oriental Study and Research in Palestine in 1901–02. His publications include: *Hebrew Lessons* (1884, 1897); *Amos* (1893), a translation of Piepenbring's *Theology of the Old Testament* (1893); *Isaiah: A Study of Chapters i–xii* (1897); *Genesis* (1909); *Ethics of the Old Testament* (1912).

MITCHELL, JOHN (?–1768). An Anglo-American botanist and geographer, a physician by profession. He settled at Urbana, Va., about 1700. It was after him that the *Mitchella repens* was named by Linnæus. He wrote *Nova Plantarum Genera* (1741) and an *Essay on the Causes of Different Colors of People in Different Climates* (1744); but his name is best known in connection with *A Map of the British and French Dominions in North America* (1755).

MITCHELL, JOHN (1870–). An American labor leader, born at Braidwood, Ill. He attended night schools as a boy and later studied law for a year. Afterward he made a private study of economics. He became a coal miner in 1882; worked and traveled in the West from 1885 to 1890; was made a subdistrict secretary and treasurer of the United Mine Workers of America in 1895; and from 1899 to 1908 was president of the organization. During his administration the union was substantially enlarged, and he effectively gave his influence and efforts to securing increase of wages and an extension of the benefits of the eight-hour law. Mitchell served as fourth vice president of the American Federation of Labor in 1898–1900 and as second vice president from 1900 to 1914. He directed the successful strikes of the anthracite miners in 1900 and 1902; the latter was brought to a close largely as a result of Mitchell's offer as the representative of the miners to accept the decision of a commission of arbitration to be appointed by the President of the United States (Roosevelt). From the first he exerted his influence in behalf of good faith on the part of labor unions in all dealings with employers. From 1908 to 1911 he was chairman of the Trade Agreement Department of the National Civic Federation, and thereafter was a member of numerous industrial commissions in New York State. Mitchell, in company with Gompers and Morrison (qq.v.), was involved in the famous Buck Stove case. The American Federation of Labor had been publishing a list of manufacturers whom they regarded as unfair in their dealings with organized labor, and advised that the organization boycott their production. Among these names was that of the Buck Stove and Range Company. In 1907 this company secured, in the court of the District of Columbia, an injunction against the officers of the federation. The publication of the name on the black list continued, however, and Mitchell and his colleagues were, in 1908, adjudged in contempt of court and sentenced to a term of imprisonment. Although the case was later dismissed on technical grounds by the Supreme Court, it was important in that it gave much impetus to the movement against injunctions in labor questions—a movement which secured prohibition of such use in the Clayton Antitrust Act of 1914. In 1914 Mitchell was appointed by Governor Glynn of New York to the State Workmen's Compensation Board for a four-year term, and when, in 1915, a new Industrial Commission took over the functions of the Board, he became a member of this. He is author of *Organized Labor: Its Problems, Purposes, and Ideals* (1903) and *The Wage Earner and his Problem* (1913). Consult H. W. Laidler, *Boycotts and the Labor Struggle* (New York, 1914). See INJUNCTION.

MITCHELL, JOHN AMES (1845–1918). American editor and author, born in New York City and educated at Exeter, N. H., and at the Lawrence Scientific School, Harvard, after which he studied architecture (1867–70) in Boston and at the Ecole des Beaux-Arts, Paris. He returned to practice for six years in Boston, but in 1876 went again to Paris, this time to study drawing and painting. From 1880 to 1883 he was active in New York as an artist,

illustrator, and writer. In 1883 he founded the comic weekly *Life*, perhaps the best periodical of its kind in the United States—an American *Punch* or *Fliegende Blätter*. From the time of its founding Mitchell gave the periodical his closest attention both as to general policy and as to detail. In addition to his work as artist and editor he published: *Croquis de l'Exposition* (Paris, 1879); *The Summer School of Philosophy at Mount Desert* (1881); *The Romance of the Moon* (1886); *The Last American* (1889); *"Life's" Fairy Tales* (1893); *Amos Judd* (1895); *That First Affair* (1896); *Gloria Victis* (1897); *The Pines of Lory* (1901); *The Villa Claudia* (1904); *The Silent War* (1906); *Dr. Thorne's Idea* (1910); *Pandora's Box* (1911).

MITCHELL, JOHN KEARSLEY (1798–1858). An American physician, born in Shepherdstown, Va. He graduated at the Medical College of the University of Pennsylvania in 1819. Before he went to Philadelphia in 1822 to practice his profession he made three voyages to the Far East as ship's surgeon. In 1826 he became professor of medicine and physiology at the Philadelphia Medical Institute and in 1833 professor of chemistry at the Franklin Institute. From 1841 to 1858 he was professor of the theory and practice of medicine in Jefferson Medical College. His works include: *St. Helena* (1821), a poem; *On the Wisdom, Goodness, and Power of God as Illustrated in the Properties of Water* (1834); *Indecision, a Tale of the Far West, and Other Poems* (1839); *On the Cryptogamous Origin of Malarious and Epidemic Fevers* (1849); the posthumous *Five Essays on Various Chemical and Medical Subjects* (1858), brought out by his son, S. Weir Mitchell (q.v.).

MITCHELL, LANGDON ELWYN (1862–). An American playwright, son of S. Weir Mitchell. Born in Philadelphia, he studied in Dresden and Paris, attended the Harvard and Columbia law schools, and was admitted to the New York bar in 1886. He wrote under the pen name of John Philip Varley, and his plays include: *In the Season*, produced in London, 1893; *Becky Sharp*, produced in 1899, a dramatization of Thackeray's *Vanity Fair; A Kentucky Belle; Step by Step; The New Marriage; The New York Idea*, produced in London, 1907; *The Kreutzer Sonata*, adapted from the Yiddish of Jacob Gordin (1907). He is also author of *Sylvian and Other Poems* (1884); *Poems* (1894); *Love in the Backwoods* (1896). Mitchell became a member of the National Institute of Arts and Letters.

MITCHELL, MARGARET JULIA (popularly known as MAGGIE MITCHELL) (1832–1918). An American actress, born in New York. She made her first regular appearance as Julia in *The Soldier's Daughter* at the Chambers Street Theatre, New York, in 1851. The parts in which she was best liked were Jane Eyre, Mignon, Little Barefoot, and Fanchon the Cricket. She was married first to Henry Paddock, her manager, in 1868, and later to Charles Abbott, and retired from the stage to live in New York.

MITCHELL, MARIA (1818–89). An American astronomer, born Aug. 1, 1818, at Nantucket, Mass. She was of Quaker ancestry. Her father, William Mitchell, a teacher and then a bank cashier, gave much attention to astronomy as an avocation and made meteorological observations for the government; her brother was the hydraulic engineer Henry Mitchell (q.v.). Miss Mitchell early became greatly interested in using her father's observatory, poorly equipped though it was, and devoted herself especially to the study of nebulæ and comets. During this period she was also librarian of the Nantucket Athenæum library, where before 1855 she had introduced a system of card indexing. After 1847, when she announced the discovery of a new telescopic comet and was awarded therefor a gold medal by the King of Denmark, Maria Mitchell's position was recognized throughout the scientific world. From 1849 to 1868 she was one of the computers for the *Nautical Almanac*. During her travels in Europe in 1857–58 she was the guest of noted foreign astronomers, and soon after her return the women of America presented to her a large equatorial telescope. At Lynn, Mass., whither she and her father removed, she built an observatory and continued her investigations until 1865, when, on the establishment of Vassar College, she was called to the chair of astronomy. This position Miss Mitchell held until ill health forced her retirement in 1888. Her resignation was not accepted, but she was granted an indefinite leave on full salary. A member and later a fellow of the American Association for the Advancement of Science and a fellow of the American Academy of Arts and Sciences, she was the first woman to be admitted to the latter body. Columbia gave her the degree of LL.D. in 1887. Her later studies were of the sun and of Jupiter and Saturn. Miss Mitchell died at Lynn, June 28, 1889. An observatory in her memory was dedicated at Nantucket in 1908. Her numerous scientific papers have not been published in collected form. Consult: M. W. Whitney (associate and successor of Miss Mitchell at Vassar), *In Memoriam* (Poughkeepsie, N. Y., 1889); Henry Mitchell, in the *Proceedings of the American Academy of Arts and Sciences*, vol. XXV (Boston, 1889–90); P. M. Kendall, *Life, Letters, and Journals of Maria Mitchell* (Boston, 1896); M. K. Babbitt, *Maria Mitchell as her Students Knew her* (Poughkeepsie, N. Y., 1912).

MITCHELL, MOUNT. See BLACK MOUNTAINS.

MITCHELL, PETER (1824–1899). A Canadian statesman. He was born in Newcastle, New Brunswick, was educated there, and in 1848 was called to the bar. He was a Liberal member of the New Brunswick Legislative Assembly in 1856–60 and in 1860 was appointed a member of the Provincial Legislative Council. In 1858 he became a member of the New Brunswick administration, firmly supported responsible government, and in 1865 suffered defeat with his government on the question of a federal union of all British North America, which he strongly favored and worked for. He was Premier of New Brunswick in 1865–67, taking office in order to test the opinion of the province on the question of confederation. When the vote was taken, confederation was carried by 33 to 8. He was a delegate to the Charlottetown and Quebec conferences on confederation in 1864 and a delegate to London in 1866 to consult in that behalf with the British government. In 1867 he was appointed Senator, but in 1874 resigned. He was Minister of Marine and Fisheries in the coalition cabinet of the Dominion government in 1867–73, was the original organizer of that department, and in 1882 was elected to the Dominion Parliament for Northumberland County, New Brunswick. In 1885 he purchased the Montreal *Herald* and for some years was

its editor. He was in 1897 appointed inspector of fisheries for the Atlantic provinces. His publications include *A Review of President Grant's Recent Message to the United States Congress, Relative to the Canadian Fisheries and the Navigation of the St. Lawrence River* (1870) and *Notes of a Holiday Trip* (1880).

MITCHELL, Peter Chalmers (1864–). A British zoölogist. He was born in Dunfermline, Scotland, the son of a clergyman; was educated at Aberdeen and at Christ Church, Oxford; and was assistant in zoölogy at Oxford in 1888–91. He lectured on biology at Charing Cross Hospital in 1892–94 and in 1903 became examiner in zoölogy to the University of London and secretary to the Zoölogical Society of London. Besides contributions to technical periodicals he wrote: *Outlines of Biology* (1894); an excellent critical sketch of Huxley (1900); *The Childhood of Animals* (1912).

MITCHELL, Samuel Alfred (1874–). An American astronomer. He was born at Kingston, Ontario, where he graduated M.A. at Queen's University in 1894. In 1898 he took his Ph.D. at Johns Hopkins. At Columbia he was tutor in astronomy (1899–1905), instructor (1905–08), and adjunct professor (1908–13), and at the Yerkes Observatory (Williams Bay, Wis.) research associate in the summers of 1907 and 1909–11. In 1913 he became professor of astronomy and director of McCormick Observatory at the University of Virginia. He was a member of the United States eclipse expeditions to Georgia in 1900, to Sumatra in 1901, and to Spain in 1905.

MITCHELL, Samuel Augustus (1792–1868). An American geographer. He was born in Bristol, Conn., but removed to Philadelphia. He prepared textbooks of geography for the use of schools, as well as maps and treatises. His books had a very extensive sale. His publications included: *American Traveler* (1843); *General View of the World* (1846); *Geographical Reader* (1849); *Traveller's Guide through the United States* (1850); *Universal Atlas* (1851); and many other works.

MITCHELL, S(ilas) Weir (1829–1914). A distinguished American neurologist and man of letters. He was born in Philadelphia, Feb. 15, 1829, the son of John Kearsley Mitchell (q.v.). Although ill health prevented graduation with his class at the University of Pennsylvania, he later entered Jefferson Medical College, Philadelphia, and took his degree in 1850. After a few years spent in general practice, Mitchell turned his attention almost entirely to diseases of the nervous system, a field in which he early achieved eminence. His special title to fame is derived from his elaboration of the system of rest treatment which has borne his name for many years and has been adopted, with modifications, the world over. His earliest work of importance consisted of researches upon the chemical composition and physiological action of the venom of snakes, in 1866 and later. He was assistant surgeon to the United States Hospital for Nervous Diseases during the Civil War and thereafter was a prolific contributor to medical literature. Besides scores of essays and monographs upon toxicology, comparative physiology, and clinical medicine, his publications include the following books or pamphlets on medical subjects: "Researches upon the Venom of the Rattlesnake," in *Smithsonian Contributions to Knowledge* (1860); *Injuries of Nerves and their Consequences* (1864); *Wear and Tear, or Hints for the Overworked* (1873); *Rest in the Treatment of Disease* (1875); *Fat and Blood, and how to Make them* (1877); *Doctor and Patient* (1888); *Clinical Lessons on Nervous Diseases* (1895). Among his later papers may be mentioned *A Clinical Reëxamination of the Motor Symptoms of Chorea* (1898) and *The Medical Department in the Civil War* (1914).

Dr. Mitchell first turned his attention to fiction and general literature during the Civil War, when he wrote *The Children's Hour*, to be sold during the great fair of the Sanitary Commission in Philadelphia. Among other pieces of juvenile fiction was *The Wonderful Stories of Fuz-buz, the Fly, and Mother Grabem, the Spider* (1867). His first novels were *Hephzibah Guinness, Thee and Thou*, and *A Draft on the Bank of Spain* (all published in 1880). Other books followed, including: *In War Time* (1882); *Roland Blake* (1884); *Characteristics* (1892); *Collected Poems* (1896); *Hugh Wynne, Free Quaker* (1898), a story of the American Revolution which ranks among the best of American historical novels; *The Adventures of François* (1898); *Dr. North and his Friends* (1900); *Circumstances* (1901); *The Youth of Washington* (1904); *Constance Trescot* (1905); *A Diplomatic Adventure* (1906); *The Red City* (1908); *John Sherwood, Ironmaster* (1911); *Westways* (1913); *Complete Poems* (1914).

Dr. Mitchell's eminence in science and letters was recognized by honorary degrees conferred upon him by several universities at home and abroad and by membership, honorary or active, in many American and foreign learned societies. In 1887 he was president of the Association of American Physicians and in 1908–09 president of the American Neurological Association. He died Jan. 4, 1914. Consult, for bibliography of Dr. Mitchell up to 1894, *A Catalogue of the Scientific and Literary Work of S. Weir Mitchell* (Philadelphia, 1894). Critical and biographical matter of interest will be found in the following: Talcott Williams, "Dr. S. Weir Mitchell," in the *Century Magazine*, vol. lvii (New York, 1898); in several articles in the *Book News Monthly*, vol. xxvi (Philadelphia, 1907); E. P. Oberholtzer, "Personal Memories of Weir Mitchell," in the *Bookman*, vol. xxxix (New York, 1914); B. R. Tucker, *S. Weir Mitchell* (Boston, 1914).

MITCHELL, Sir Thomas Livingstone (1792–1855). A Scottish explorer. He was born in Stirlingshire, Scotland, began his service in the British army in the Peninsular campaign of 1808, and in 1826 was promoted to be major. He was then sent to make surveys and plans of the Peninsular battlefields. In 1827 he published *Outlines of a System of Surveying for Geographical and Military Purposes* and was made Deputy Surveyor-General of New South Wales in 1828. Besides attending to the routine work of this office he led four exploring expeditions into the interior of Australia. In 1835 he traced the course of the river Darling, which he followed, in 1836, as far as the Murray River, with which it unites. In the same expedition he followed the Glenelg River to the ocean. He gave the world the results of his explorations in his *Three Expeditions into the Interior of Eastern Australia* (2 vols., 1838). He went to England in 1839, and on his return to Australia in 1840 conducted a fourth exploring expedition, which is described in his *Journal of an Expedition*

into the Interior of Tropical Australia in Search of a Route from Sydney to the Gulf of Carpentaria (1848). In addition he published *Australian Geography* (1850) and *The Lusiad of Camoens Closely Translated* (1854).

MITCHELLA. See PARTRIDGE BERRY.

MITCH'ILL, SAMUEL LATHAM (1764–1831). An American scientist, born at North Hempstead, Long Island, N. Y. He graduated in medicine at the University of Edinburgh in 1786 and from 1792 to 1801 was professor of chemistry, natural history, and philosophy in Columbia College. In 1796 he made a geological and mineralogical tour of the State of New York, and his report thereon gave him an international reputation in scientific circles. Jointly with Dr. Edward Miller and Elisha H. Smith he established the quarterly *Medical Repository,* of which he was for 18 years the editor. He several times represented his district in the State Legislature and in Congress, and in 1804 was elected a Democratic United States Senator. In 1808–20 he was professor of natural history and in 1820–26 professor of botany and materia medica in the College of Physicians and Surgeons. In 1818 he was appointed surgeon-general of the New York State militia. He was called the "Nestor of American science." His researches embrace a wide variety of scientific and philosophical subjects, and he published a large number of papers and several larger works. Consult "Memorable Events and Occurrences in the Life of Samuel L. Mitchill, of New York, from the Year 1786 to 1827," by himself and Dr. Francis, contained in S. D. Gross, *Lives of Eminent American Physicians and Surgeons of the Nineteenth Century* (Philadelphia, 1861).

MITE, mīt, (AS. *mīte,* OHG. *mīza, mizza,* Ger. *Miete;* probably connected with Goth. *maitan,* OHG. *meizan,* to cut). Any one of the Acarina, an order in the class Arachnida. They may be distinguished from other arachnids by their small size; by the unsegmented body, without a constriction between the anterior portion or cephalothorax and the posterior portion or abdomen; and by the lack of median eyes. There are exceptions, however, to all these characteristics, and certain forms have been misplaced even by naturalists. The mouth segments have become united to form a beak or rostrum, but this character is not easily recognized. The young mite, on hatching from the egg, is not provided with eight legs as are other arachnids, but with only four or six, except in the case of *Pteroptus.* In size mites vary from tiny creatures, invisible to the naked eye, to certain tropical forms fully half an inch long.

Typically, mites have four pairs of legs, arranged more or less definitely in two groups. The two hinder pairs are apparently attached to the abdomen, while the anterior pairs are close to the mouth parts, which consist of mandibles of varied character, palpi, and maxillæ. The mandibles are typically chelate, but in several families they are reduced to needle-like piercing organs. In the case of certain gamasid mites the mandibles are nearly as long as the entire animal, and can be wholly retracted within the body, or suddenly extruded to seize the prey. The palpi are of four kinds. Simple, filiform palpi, which have a tactile function, are found in many families. In some parasitic forms the palpi are reduced in size and united to the rostrum. In many predatory mites the palpi are modified for raptorial organs. In some of the water mites the palpi have become organs for holding the mite to other objects. The legs of mites are composed of from five to seven segments, and commonly terminate in from one to three claws. In many genera a

A MITE OR RED SPIDER (*Tetranychus bimaculatus*).

cup-shaped sucking disk or ambulacrum is attached to the tarsus or last segment. The reproductive organs, as in other arachnids, open on the underside of the abdomen near its base. The body and legs are more or less thickly clothed with bristles, hairs, or scales, which are of characteristic nature and arrangement in each species. In many of the soft-bodied species there are chitinous plates or shields, sometimes so large or numerous as almost completely to cover the mite. In the ticks the body is flat and of a tough, leathery consistency.

The sense organs are few and of simple nature. Many mites have no eyes, but in some there are one or two ocelli-like spots on each side of the cephalothorax. A few families have what are considered organs of hearing. With the ticks this organ is a membrane-covered pit in the anterior tarsi; in the beetle mites it is a pore on the posterior margin of the cephalothorax, from which arises a bristle. The sense of touch is supposed to reside in some of the hairs of the body or legs. In many mites there is a considerable difference in appearance between the two sexes, although there is not often much difference in size.

Centralization is the peculiar characteristic of the anatomy of mites. The various organs are more crowded together than in other arachnids. The digestive system, when complete, consists of the pharynx or sucking organ, the œsophagus, the ventriculus or stomach, with its cæca, the hind-gut, and the Malpighian vessels. The œsophagus is a long, simple tube extending through the centre of the brain. The stomach is of varied size, according to food habits; in some forms it is very small, while the cæca are numerous and long. The hind-gut or intestine is a short tube ending in the rectum. The Malpighian vessels, when present, are two in number and enter the intestine near its end. In some mites there is a well-developed dorsal pulsating organ or heart, but in others it is not present. The nervous system consists of one ganglionic mass surrounding the œsophagus, from which all the principal nerves arise. Many mites have an elaborate system of tracheæ by which they breathe and which open in various parts of the body, in many common species near the mandibles, but in the ticks and gamasids they open by stigmata near the hind legs. A great number of mites, however, have no internal respiratory system whatever. In these the skin is soft and they absorb oxygen by osmosis.

Life History. Nearly all mites deposit eggs, frequently of large size. In a few forms the larvæ issue from the parent, but in some cases it is rather from the egg within the body of the dead mite. In many cases the hard external skin or chorion of the egg splits into halves and

exposes the lining vitelline membrane; this permits the maturing egg to increase in size, which is then called a deutovum. The young larvæ on hatching commonly have six legs, but the gall mites have but four. During the nymphal stage the mite feeds until it attains adult size. In many cases the nymph molts directly into the adult mite, but in several families the nymph often transforms into a creature entirely different from both the nymph and the adult—the hypopial stage, or hypopus, long supposed to be a distinct genus of mites. On its ventral or under surface is an area of sucking disks, by which the hypopus attaches itself to an insect or small mammal and is transported to some new and suitable locality, where it falls from its carrier, molts into an octopod nymph, begins feeding, and in due time becomes an adult mite. The hypopus is, therefore, not a parasite, but a commensal, making use of the carrier only for transportation; and in certain gamasids (*Uropoda*) the mite in this migratorial stage is attached by a thread of hardened excrement to its host.

In some families (as the Trombidiidæ) the larval and nymphal stages are attached to various insects and feed thereon, while the adult is free. In some of the beetle mites the nymph carries on its back old molted skins, eggshells, and other débris. In these mites there is a considerable resting period while the nymph is changing to the adult, a period when much of the internal anatomy is entirely changed; and it has been observed that when the adult emerges its legs are not withdrawn from the legs of the nymph but from beneath the body. In the bird mites there is a transition form between the nymph and the adult female, known as the nymphal female. The adult male mates with this nymphal form, and when the real adult emerges, an egg, already of considerable size, is seen in her body. Parthenogenesis has been observed in a number of mites. As a rule, mites possess no special accessory sexual organs, comparable to those of spiders, but in some male gamasids the mandibles carry the globule of sperm cells and insert it in the female vulva. In many species the males have one pair of legs enlarged and modified to act as claspers for holding the female. The eggs are usually deposited singly, but many gall mites and harvest mites place them in clusters.

Habits. The habits of mites are very diverse. Most mites ordinarily move quite slowly and deliberately; very few mites are fitted for leaping. The spinning mites, or "little red spiders" (*Tetranychus*), produce a tiny thread wherever they go, the accumulated threads of many individuals making a whitish mesh or web. More than one-half of the known mites are parasitic, at least during part of their life. The ticks are well known to infest various mammals, birds, and even snakes and turtles. They have mouth parts especially fitted for cutting into the skin of the host and sucking up the blood. (See TICK.) One group of the gamasids is parasitic on bats, birds, and small mammals. The bird mites live upon the skin and feathers of birds, but as they feed upon epidermal scales and loose bits of feathers, they do not injure their hosts, but are rather of service in keeping the skin and feathers clean. The itch mites burrow within the skin of man and other mammals. Other species live in the cellular tissue of birds. A few occur in the tracheal passages of seals, and one has been found living in the lung of a monkey. Many species feed on living plants, and the gall mites produce deformations on the leaves and twigs of plants. Since these gall mites are invisible to the unaided eye, the deformations were formerly supposed to be fungi. Many of the beetle mites feed on fungi, lichens, and other low vegetation. A large number of mites are predacious and attack other mites and small insects. There is a large family, the water mites, living in fresh water, sometimes as commensals within the gills of bivalve mollusks; another group lives in the ocean, even at a considerable depth. In recent years investigators have found a number of mites associated with ants.

Injuries. The injuries caused by mites are arranged in two classes—injuries to man and domestic animals and injuries to cultivated plants and stored food. The most notable of the former class are the ticks. The famous miana bug of Persia is a tick of the genus *Argas*, which inhabits houses, and the early travelers in those regions declared that its bite or puncture would produce convulsions, delirium, and even death. Specimens kept in Europe, however, have proved to be comparatively harmless. The moubata bug of Africa is a similar tick with a similar reputation. An allied species, the chicken tick (*Argas miniata*), does considerable damage to poultry in the Southern States. The cattle tick (*Boöphilus bovis*) is the most injurious of all mites, as it occurs in nearly all warm countries and is the means of spreading the Texas or Southern cattle fever. The itch mites, that cause a disgusting scaling of the skin, were formerly not uncommon, but modern cleanliness has largely abolished them in the case of man. A species known as the sheep scab mite (*Psoroptes communis*) is the cause of much injury to sheep, both in flesh and wool. The red

CLOVER MITE (*Bryobia pratensis*).

spider (*Tetranychus*) is a perennial source of trouble to greenhouse and outdoor plants, while the clover mite is a pest of fruit trees in the West, and a related form (*Stigmæus*) injures pineapples in Florida. To the family of cheese or flour mites (Tyroglyphidæ) belong a number of injurious species. The true cheese or flour mites (*Tyroglyphus* and *Aleurobius*) feed on a great variety of stored products—cheese, flour, hams, cereals, drugs, seeds, and dried fruits. Although they are very small, they multiply so rapidly that attacked materials are completely overrun with them in a few days. Some species infest mushrooms and are a serious hindrance to their cultivation. The bulb mite or eucharis mite (*Rhizoglyphus*) burrows within bulbs and the roots of plants, thereby giving entrance to destructive fungi; the bulbs of lilies and orchids are particularly subject to their ravages. A few species of gall mites are of great economic

importance, especially the pearleaf blister mite (*Eriophyes pyri*), which is a notorious enemy of pear culture in the United States. Certain species of Tarsonemidæ, living in enormous numbers in the heads of grasses, are known to cause a whitening of the grass, called silvertop.

Comparatively few mites are beneficial to man. One of the harvest mites is known to destroy the eggs of grasshoppers, and various species of *Cheyletus* prey on the flour mites and other injurious forms. Several species have been found feeding on scale insects.

Classification. The mites, formerly all kept in one family, have, in recent years, been divided into from 10 to 30 families, according to the author. The leading families are the following:

Trombidiidæ and Rhyncholophidæ, or harvest mites; many of large size and bright-red color.

Eupodidæ, consisting of many small, soft-bodied species that occur on moist soil.

Tetranychidæ, spinning mites, red spiders, and clover mites.

Bdellidæ, or snouted mites, from the long, projecting mandibles; predacious.

Cheyletidæ, mites with stout, spiny palpi; predacious or parasitic.

Oribatidæ, or beetle mites; so called from their hard and often shining bodies; very numerous, but of little economic importance.

Gamasidæ, many predacious and lurking commonly under fallen leaves and in moist places.

Ixodidæ, or ticks, all parasitic.

Tarsonemidæ, soft-bodied and of curious structure.

Tyroglyphidæ, cheese and flour mites, soft-bodied forms, in which the hypopus stage is very common.

Hydrachnidæ, or fresh-water mites; and Halacaridæ, or marine mites.

Sarcoptidæ, or itch mites; and Analgesidæ, or bird mites.

Eriophyidæ, or gall mites, remarkable for their minute size, tapering, annulate body, and possessing only four legs. See CHIGOE, 2.

MIT'FORD, JOHN (1781–1859). An English author and divine, born at Richmond in Surrey, Aug. 13, 1781. He graduated B.A. from Oriel College, Oxford, in 1804. Five years later he took orders in the English church, and in 1810 he received from Lord Redesdale the vicarage of Benhall in Suffolk. A few years later he obtained two other livings in the same shire. At Benhall he built a parsonage, collected a choice library, and amused himself in gardening. He took permanent lodging in London, where as time went on he came to live for most of the year. He was an intimate friend of Samuel Rogers, of Charles Lamb, and of other literary men. From 1834 to 1850 he edited the *Gentleman's Magazine*, to which he contributed largely. He died at Benhall, April 27, 1859. His *Miscellaneous Poems* appeared in 1858. For the Aldine edition of the English poets he contributed 11 memoirs. His best critical work was on Gray, found in *The Works of Thomas Gray* (1814) and in the Aldine edition (5 vols., 1835–43). His researches have been very freely used by succeeding editors. Mitford left three volumes of manuscript on Gray and a large mass of other manuscript, much of which is now in the South Kensington Museum and the library of the British Museum.

MITFORD, MARY RUSSELL (1787–1855). An English authoress, born at Alresford, Hampshire, Dec. 16, 1787. In 1797 she drew £20,000 in a lottery, with a part of which her father built a house at Reading. She was sent to a good London school for a short time (1798–1802) and then returned to her father's house. At this time she was reading extensively. In 1810 she published *Miscellaneous Poems*, which were immediately followed by other volumes (1811, 1812, 1813). The family, reduced to poverty as a result of the father's improvidence, moved in 1820 to a laborer's cottage at Three Mile Cross, a village near Reading. For a living she now began writing for the magazines and the stage. Among her plays (tragedies), which were moderately successful, are *Julian* (1823), *Foscari* (1826), and *Rienzi* (1828). In the meantime she had taken to writing sketches of village life as she had observed it. They were published (5 vols., 1824–32) in installments, under the title *Our Village*. These descriptive pieces possess charm, grace, and humor akin to Jane Austen's. They were followed by the more regular novel of country life, *Belford Regis* (1835), and, after a long interval, by *Atherton and Other Tales* (1854). In 1851 Miss Mitford removed to a near-by cottage at Swallowfield, where she died, Jan. 10, 1855. Consult: A. G. K. L'Estrange, *Life of Mary Russell Mitford* (London, 1870); id., *The Friendships of Mary Russell Mitford as Recorded in Letters from her Literary Correspondents* (2 vols., ib., 1882); J. T. Fields, *Yesterdays with Authors* (Boston, 1899); W. J. Roberts, *Mary Russell Mitford: The Tragedy of a Blue Stocking* (London, 1913); *Correspondence of Mary Russell Mitford with Charles Boner and John Ruskin*, edited by Elizabeth Lee (New York, 1915).

MITFORD, WILLIAM (1744–1827). An English historian, born in London. He studied at Queen's College, Oxford, and in 1769 became a captain in the South Hampshire militia. He made the acquaintance of Gibbon, then a fellow officer, by whose advice and encouragement he was induced to undertake his celebrated *History of Greece*. The first volume of this work appeared in 1784, and the fifth and last in 1810; it was supreme in European literature till Grote's *History of Greece* appeared. He was three times elected to Parliament, and was professor of ancient history at the Royal Academy. He also wrote *An Essay on the Harmony of Language* (1774) and several minor works.

MITH'AN. The name of the gayal (q.v.), among the Indo-Chinese tribes west of the Bay of Bengal.

MITHRADATES. See MITHRIDATES.

MITH'RAS (Gk. *Μίθρας*, OPers. *Miθra*, Skt. *Mitra*, friend). One of the chief deities of the ancient Persian religion. The god seems to have been known to the Indo-Iranians before their separation, as he appears in both the Avesta and the Veda. He is a god of light, invoked in company with the heaven (Ahura and Varuna), and is the guardian of truth and the enemy of all falsehood. In India this deity seems to have been early superseded, but in Persia he retained his place as one of the chief gods. It may be considered very doubtful whether the god was borrowed from the early Babylonians at a date long before our knowledge begins, more especially as in the earlier texts Mithras is not the sun but the light of heaven. In the Zoroastrian religion he is one of the Yazata, or spirits of the second rank, though even here he occupies a high position, seeing and knowing everything, a being whom it is impossible to deceive and in constant

conflict with the powers of darkness, so that he becomes a warrior god, who is the chief helper of Ahura-Mazda in his struggle with Ahriman (see ZOROASTER; ZOROASTRIANISM) and, by a natural development, of truth and loyalty. In the Old Persian inscriptions, it should be said, he is invoked by the Achæmenidæ along with Ahura-Mazda and Anahita, and his festival (on the sixteenth day of the seventh month) was one of the solemn functions of the state religion. Honored by the numerous princes who built up small principalities throughout western Asia after the division of Alexander's kingdom, the god was a prominent divinity in Cilicia, Cappadocia, and Commagene, though practically unknown in the Greek world. From these regions his worship came to the West to the Romans, through the Cilician pirates conquered by Pompey. It is not mentioned, however, by contemporary Roman writers till the first century of our era, and the earliest Latin inscriptions that name Mithras belong to the early second century. The cult with its mysteries was popular in the army and quickly spread over the whole Roman world, as its monuments in all the frontier provinces plainly show, and became the chief opponent of Christianity. The nature of the religion is obscure, as the sacred writings have perished and information must be drawn either from the writings of Christian adversaries or from the representations in the numerous places of worship. It seems clear that the basis of the cult was derived from the Mazdean worship, but with a considerable mixture of Chaldæan worship of the heavenly bodies. Mithras seems to have owed his prominence to the belief that he was the source of all life and could also redeem the souls of the dead and bring them into the better world. This worship was celebrated in underground chambers of small size, to which only those who belonged to the higher degrees were admitted, and was probably conducted according to elaborate ritual prescriptions. (For such a Mithræum at Rome, consult W. Dennison, "The Newly Discovered Mithræum at the Baths of Caracalla," in the *Classical Weekly*, vii, 151–152, New York, 1915.) The ceremonies included a sort of baptism to remove sins, anointing, and a sacred meal of bread and water, while a consecrated wine believed to possess wonderful power played a prominent part. With the cult of Mithras went a belief in the immortality of the soul and in the resurrection of the dead; it was this belief in particular that brought the followers of Mithras and the Christians into collision. The mysteries contained seven degrees, of which the first three seem to have been probationary and not to have admitted to the sacred ceremonies. The degrees are given in this order: (1) *Corax* or Raven; (2) *Gryphus* or Griffin; (3) *Miles* or Soldier; (4) *Leo* or Lion; (5) *Perses* or Persian; (6) *Heliodromos* or Courier of the Sun; (7) *Patres* or Fathers, who were at the head of the cult, and whose chief was the *pater patrum*. The other initiates called themselves brethren (*fratres*). Women seem to have been excluded from the rites proper of Mithras, but in the western part of the world those rites were brought in close alliance with the worship of the Great Mother of the Gods (q.v.), which was open to women as freely as to men. The nature of the initiation is not known. The undoubted similarity in much of this worship to the new religion of Christianity seems only to have made the battle between the rivals bitterer, and with the triumph of Christianity and the loss of the eastern provinces of the Roman Empire began the destruction of the Mithras worship, and by the end of the fourth century it seems to have been practically extinct in the West. Consult: F. V. M. Cumont, *Textes et monuments figurés relatifs aux mystères de Mithras* (Brussels, 1894–99); id., *Les mystères de Mithras* (2d ed., Paris, 1902), translated by T. J. McCormack as *The Mysteries of Mithras* (Chicago, 1903); id., in *The Open Court* (Chicago, November, 1902); A. Dieterich, *Eine Mithrasliturgie* (Leipzig, 1903); F. V. M. Cumont, *Les religions orientales dans le paganisme romain* (Paris, 1906), translated as *The Oriental Religions in Roman Paganism* (Chicago, 1911); J. B. Carter, *The Religious Life of Ancient Rome* (Boston, 1911); D. N. Robinson, "A Study of the Social Position of the Devotees of the Oriental Cults in the Western World, Based on the Inscriptions," in the *Transactions of the American Philological Association*, vol. xliv (ib., 1913).

MITHRIDATES, mĭth'rĭ-dā'tēz, or **MITHRADATES** (gift of Mithras, from OPers. *Miθra*, the sun god + *dāta*, given, p. p. of the root *da-*, to give). An old Persian name, common throughout the East, borne by several kings of Pontus. The most celebrated of them and the greatest of the rulers of Pontus was Mithridates VI, surnamed *Eupator* and *Dionysus*, but commonly called Mithridates the Great. He was born at Sinope about 134 B.C. and succeeded his father, Mithridates V, about 121 B.C. For a time, however, his mother was too strong for him, so that he withdrew to the mountains and lived there as a hunter. But at the age of about 20 he took the reins of government into his own hands. Little that is certain is known of the early part of his reign. He soon subdued the tribes along the northern coast of the Euxine as far as the Tauric Chersonese and set his son, Machares, on the throne of the Kingdom of Bosporus (q.v.); he then prepared to extend his conquests south of the Euxine and invaded Cappadocia and Bithynia. Here he encountered the Romans, who restored the kings of Bithynia and Cappadocia to power. Mithridates waged three wars with the Romans, known as the First, Second, and Third Mithridatic wars—the First, 88–84 B.C.; the Second, 83–82 B.C.; the Third, 74–65 B.C. The immediate cause of the First Mithridatic War was the invasion of the territories of Mithridates by Nicomedes, King of Bithynia, at the instigation of the Romans. Mithridates quickly compelled Nicomedes to withdraw, but was in the end defeated by the Roman general Flavius Fimbria, while his general Archelaus was defeated in Greece by Sulla. It was in the course of this war that Mithridates issued an order to all the cities of Asia to put to death, on the same day, all the Roman and Italian citizens who were to be found within their walls. Eighty thousand Romans and Italians are said to have perished in this massacre. As a result of the First Mithridatic War Mithridates consented to abandon all his conquests in Asia, to pay a sum of 2000 talents, and to surrender to the Romans a fleet of 70 ships. The Second Mithridatic War was due to the invasion of Mithridates' dominions by the Roman general Murena. The war was in the main favorable to Mithridates, but was short-lived, Murena being soon ordered by Sulla to withdraw. In 74 B.C. Nicomedes

III, King of Bithynia, died, leaving his dominions by will to the Romans. Mithridates claimed that Nicomedes had left a legitimate son and at once prepared to assert the latter's right. The Third Mithridatic War ensued. At first alone, and then supported by his son-in-law, Tigranes, King of Armenia, Mithridates successfully opposed the Roman forces, but in 66 B.C. the conduct of the war was intrusted to Pompey. (See LUCULLUS, LUCINO LICINIUS.) Mithridates was then obliged to retreat beyond the Euxine, where, besieged by his son, Pharnaces, who had rebelled against him and had been proclaimed King, he took his own life at Panticapæum in 63 B.C. Mithridates was a specimen of the true Eastern despot, but he possessed great ability and extraordinary energy and perseverance. His want of success was owing, not to his defects as a general, but to the impossibility of raising and training an army capable of coping with the Roman legions. He had received a Greek education at Sinope, could speak more than 20 different languages, and had a taste for art and science and appreciation of them. He owned a magnificent collection of pictures, statues, and engraved gems. In the estimation of the Romans he was the most formidable opponent they had ever encountered. Consult Theodor Reinach, *Mithridate Eupator* (Paris, 1890), translated into German, with corrections and additions by Reinach, by A. Goetz (Leipzig, 1895), and the article "Mithridates, 6," in Friedrich Lübker, *Reallexikon des klassischen Altertums* (8th ed., Leipzig, 1914).

MITLA, mē'tlä, or **MICTLAN**, mēk-tlän'. A famous ruin 30 miles east of Oaxaca City in southern Mexico. The name is Aztec and means 'the place of the dead.' In the centre of a wide, fertile valley surrounded by mountains are five clusters of stone buildings built around paved courts. Long stone lintels are used over the wide doorways. The walls of heavy concrete are veneered with cut stone and the façades are ornamented with sunken panels containing mosaics of finely carved stones in geometrical patterns. Traces of mural paintings are still visible. Cruciform tombs are located under some of the buildings. Little is known concerning the history of this remarkable site except that it was a centre of late Zapotecan culture captured about 1495 by the Aztecs.

The five clusters of stone buildings have been named (1) group of the Curacy; (2) the Columns; (3) the Arroyo; (4) the Adobe; (5) the South Side. Other foundations exist and a mile or so distant, on an isolated hill, are the remains of a fort.

The buildings, which are worthy of the name of temples or palaces, are massive, rectangular structures of dressed stone, set on platforms and erected with surprising accuracy. The stones are laid with such precision that the joints are scarcely discernible, and for this reason little mortar was required. The ground plan is simple and the rooms are, as a rule, long and narrow, while the walls are but one story in height. The grouping of the buildings is in the form of quadrangles.

The walls are faced with dressed stone or plaster. Mosaic stonework is used lavishly, the designs being frets and other geometric designs. The exterior walls have no openings, but the single or triple doorways that open on the courts are imposing in their massive treatment with monolithic lintels. The rooms were ceiled with beams of wood or slabs of stone. In case the room was wide two sets of beams were used, supported on a row of large stone columns, some of which are 16 feet high and 36 inches in diameter. The roofs were massive and flat, and probably constructed of beams, cross poles, and filling material of brush, capped with rammed clay, similar to the method employed by the Pueblo Indians of the southwestern United States. The floors were made of a durable cement. On the whole, the Mitla buildings, while formal in plan and profile, show perfect and charming mosaic surface decoration, arranged in panels which exhibit great fertility of geometric design, as well as skill in execution. In the Curacy and Arroyo groups mural paintings resembling the pictographs of the codices were employed on the lintels. A noteworthy feature is that realistic sculpture is almost lacking in these buildings.

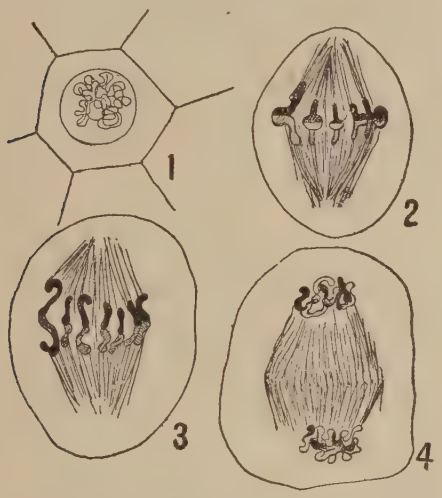
Two of the palaces have a basement chamber in the form of a cross. Several of these cruciform structures have been discovered in and near Mitla, but nowhere else in Mexico have they been observed, except at Chila in Puebla. It is surmised that they were sepulchres of important personages. The character of the Mitla masonry is also seen in the interesting fortified hill situated about 1 mile west of the village. In location, massiveness of construction, and skill in plan it ranks with the ancient fortifications of Peru. Piles of rounded stones on the walls indicate that the fort was defended by slingers. The quarries from which the ancient Mitlans secured their materials have been discovered. The blocks were obtained by channeling with stone picks and hammers the full length of the stones and across the ends; then channels were cut down the sides and under the blocks until they could be broken off. Enormous stones in all stages of the work still remain in the quarry. Pottery of excellent design and finish has been found. Painted pottery is uncommon here. Fan-shaped implements, a few celts of copper, and gold bells and beads have been found in the tombs. A remarkable cruciform tomb was found by Saville 5 miles from Mitla. These ruins are mainly of stone, but there are evidences of adobe buildings, and some mounds probably supported wooden structures. The large buildings were probably for religious purposes, but their exact use has not been determined by the researches yet made.

Consult: C. J. D. Charnay, *Cités et ruines américaines* (Paris, 1863); A. F. A. Bandelier, *Archæological Tour in Mexico in 1881* (Boston, 1884); W. H. Holmes, "Archæological Studies among the Ancient Cities of Mexico," in *Field Museum of Natural History, Anthropological Series* (Chicago, 1895–97); M. H. Saville, "Cruciform Structures Near Mitla," in *American Museum of Natural History, Bulletin*, vol. xiii (New York, 1900); Eduard Seler, "Wall Paintings at Mitla," in *Bureau of American Ethnology, Bulletin 28* (Washington, 1904).

MITO, mē'tô, or **MYTHO**. A town of Cochin-China, situated on an arm of the Mekong, about 45 miles southwest of Saigon, with which it is connected by rail (Map: French Indo-China, E 4). It has a college and a hospital and is on the trade route between Cambodia and Annam. Pop., 30,000.

MITO'SIS (Neo-Lat., from Gk. *mitos*, *mitos*, thread). The phenomena accompanying the division of the nucleus of cells, a term proposed by

Fleming in 1882 and superseding "karyokinesis." In cell division the seat of the changes is the nucleus, in which portion of the cell the processes of cell division originate. After the nucleus subdivides the entire cell divides into halves, forming two new cells. Mitosis occurs not only in the division of cells during growth, but the nucleus subdivides, forming the first steps in reproduction or fertilization of all organisms. When the nucleus is about to divide, the chromatic granules forming part of the nuclear substance, and previously scattered throughout the central mass of the nucleus, become arranged in a row, forming a long thread,



STAGES IN MITOSIS.

1, preparatory to division; 2, early stage in separation of chromosomes; 3, later state in separation; 4, formation of daughter nuclei at poles, and of wall at equator of spindle.

which extends through the nucleus in an irregular spiral (spireme) and then divides into portions (chromosomes) of fairly equal length. The chromosomes are shaped like long loops, which afterward become shortened, thus giving rise to short loops, straight rods, or rounded granules. As a rule the number of chromosomes is constant for each species of plant or animal and also for successive series of cells during growth. By the time the process has reached this stage a special mechanism appears, which has till now remained concealed in the cell substance. This serves to divide the chromatin elements into two equal parts, to separate the resulting halves from one another, and to arrange them in a regular manner. At the opposite poles of the longitudinal axis of the nucleus two clear bodies—the centrosomes, each surrounded by a clear zone, the so-called sphere of attraction—now become visible. These were first discovered by Fol, by Van Beneden, and also by Boveri, who recognized their importance. They appear to possess a great power of attraction over the vital particles of the cell, so that these become arranged around them like a series of rays. At a certain stage in the preparation for division the substance of the cell body and of the nucleus gives rise to delicate fibres or threads; these fibres are motile and, after the disappearance of the nuclear membrane, seize the chromosomes with wonderful certainty and regularity, and in such a way that each element is held on either side by several threads from each pole. The chromatin elements thus immediately become arranged in a fixed and regular manner, so as to lie in the equatorial plane of the nucleus. The centrosomes and threads or astral fibres (*aster*), called the spindle, together form the amphiaster. The chromatin elements next split longitudinally, thus becoming doubled, as discovered by Fleming. This splitting is completed by the two halves being gradually drawn farther apart towards the opposite poles of the nuclear spindle, until they finally approach the centre of attraction or centrosome, which has now fulfilled its object for the present and retires into the obscurity of the cell substance, only to become active again at the next cell division. Each separate half of the nucleus now constitutes a daughter nucleus in which the chromatin breaks up and is scattered in minute granules in the nuclear network. The body of the cell then divides, showing two new cells. Roux has pointed out that the whole complex but wonderfully exact apparatus for the division of the nucleus exists for the purpose of dividing the chromatin substance in a fixed and regular manner, not merely quantitatively, but also in respect of the different qualities which must be contained in it. It will be remembered that the chromatin particles or chromosomes are believed to be bearers of heredity. The mechanism of mitosis is thus far unknown. The problem may be solved, as Wilson states, through chemical research.

Amitosis. Mitosis is the indirect division of the nucleus: where the nucleus elongates and directly divides through its total mass the process is called amitosis. This appears to occur exceptionally, but is known to take place in amœba, in leucocytes, and has been observed in the sperm cells and eggs of batrachians and some insects, but more commonly in pathological tissues.

Bibliography. Walther Fleming, *Zellsubstanz, Kern und Zellteilung* (Leipzig, 1882); Roux, *Ueber die Bedeutung der Kernteilungsfiguren* (Leipzig, 1883); *Gesammelte Abhandlungen über Entwicklungsmechanik der Organismen* (ib., 1895); August Weismann, *The Germ Plasm: A Theory of Heredity*, translated by W. N. Parker (New York, 1902); E. B. Wilson, *The Cell in Development and Inheritance* (2d ed., revised and enlarged, ib., 1911). See CELL; EMBRYOLOGY; MECHANICS OF DEVELOPMENT.

MITRA, mē'trȧ (Skt., friend). A Vedic Hindu god of light. He is mentioned most frequently in company with Varuna (q.v.), with whom in the Veda his attributes blend. Although he seems to have been a god of importance in the Indo-Iranian religion, he lost his rank early in the Indian period and was not recognized after the Vedic age. His Iranian counterpart, Mithras (q.v.), however, was one of the chief deities of the pre-Zoroastrian religion, where he represented the sun. Consult Hillebrandt, *Vedische Mythologie*, vol. iii (Breslau, 1902).

MITRA, RAJENDRALALA (1824–91). An Indian Orientalist, born in Calcutta. He belonged to the Kulin-Kayasth caste and was to a great extent self-educated. In 1846 he was appointed librarian of the Asiatic Society in Calcutta, and later philological secretary and vice president of the same organization. In 1885 he was elected president of the society, being the first native to attain that honor. He made

numerous contributions to the *Journal* of the society as well as to the series *Bibliotheca Indica*, editing more than 80 texts, at times with English translations. He was granted the title of Companion of the Indian Empire after the establishment of that Order in 1878 and was made a rajah 10 years later. The most important of his works are: *The Antiquities of Orissa* (2 vols., 1875, 1880); *Buddha Gaya, the Hermitage of Sakya Muni* (1878); *Catalogue of Sanskrit Manuscripts in the Library of the Mahârâjâ of Bikâner* (1880); *Indo-Aryans: Contributions towards the Elucidation of their Ancient and Mediæval History* (2 vols., 1881); *The Sanskrit Buddhist Literature of Nèpal* (1882); *History of the Asiatic Society of Bengal*, in the centenary review of the society (1885); and a translation of the *Twelve Principal Upanishads* (1891).

MITRAILLEUSE, mē'trâ'yēz' (Fr., mitraille firer, from *mitrailler*, to fire mitraille, from *mitraille*, bits of grapeshot, from OF. *mitaille*, fragments, from *mite*, small bit; ultimately connected with Goth. *maitan*, to cut). A machine gun, in which is combined a number of rifle barrels, with breech-action mechanism, and designed to discharge small missiles with great rapidity. It was invented in Belgium, and adopted by the French a little before the war with Germany in 1870. Its official name is *canon à balles* (bullet cannon). The name *mitrailleuse* is now given to any machine gun whatever. See MACHINE GUN.

MI'TRAL VALVE. See HEART; CIRCULATION.

MI'TRE (OF., Fr. *mitre*, from Lat. *mitra*, from Gk. *μίτρα*, mitre, fillet, belt; probably ultimately of Oriental origin). The headdress worn in solemn functions by bishops and some abbots. The ornament is probably of Eastern origin, although the headdress of Eastern prelates at the present day is quite different, being a large round cap something like a crown. The Western mitre is a tall, tongue-shaped cap, terminating in a two-fold point, supposed to symbolize the "cloven tongues as of fire" in which the Holy Spirit descended upon the Apostles; two flaps or streamers fall from it behind over the shoulders. Opinion is much divided as to the date at which the mitre first came into use. Eusebius, Gregory of Nazianzus, Epiphanius, and others speak of an ornamented headdress worn in the Church; but there is no very early pictorial representation which exhibits any head covering at all resembling the modern mitre. From the tenth century, however, it is undoubtedly found in use, although not at first universally. At the Reformation the mitre was practically discarded as a part of the episcopal costume in England, though there are traces of its survival in isolated instances; and the first Bishop of the Episcopal church in America, Seabury, occasionally wore one. In the last half of the nineteenth century the practice was revived with increasing frequency in the Anglican communion. In the Roman Catholic ritual three kinds of mitres are distinguished: *mitra pretiosa*, richly ornamented with jewels, gold, and silver; *mitra auriphrygiata*, made up of gold brocade with embroidery; and *mitra simplex*, formed of white silk or linen damask, with scarcely any decoration, which is worn when black vestments are used. See COSTUME, ECCLESIASTICAL, and Plate.

MITRE, mē'trâ, BARTOLOMÉ (1821–1906). An Argentine statesman, soldier, and author, born at Buenos Aires. While a mere boy he went to Uruguay with his father and there in 1838 began his literary career as a contributor to *El Iniciador* of Montevideo. He continued to contribute to *El Nacional* and other periodicals during his residence in Montevideo. In 1839 he began his military career and in 1842 played an important part in the defense of Montevideo against the siege by Oribe. He was a member of the secret society, Asociación Nacional, which exerted a large influence on the government, and of the Assembly of Notables, which acted in place of a legislative body. A revolt, directed by the Porteños, caused Mitre to flee to Bolivia, where President Ballivian placed him in charge of the Military College. He was the President's chief of staff during a revolution and was decorated by the Bolivian government for his services. Upon the overthrow of Ballivian Mitre was exiled, going first to Peru and then to Chile, where he edited *El Comercio* at Valparaiso and *El Progreso* at Santiago. For attacking the corruption of the government his presses were confiscated and he was arrested and banished to Peru. In 1851 he returned to Argentina and joined Urquiza in the uprising against Rosas. He was in command of a battery of artillery in the battle of Monte Caseros (Feb. 3, 1852), in which Rosas was overthrown. Elected deputy of the Province of Buenos Aires, he openly attacked Urquiza, who was hostile to the Province of Buenos Aires, and assailed the Acuerdo de San Nicolás, which gave Urquiza unlimited powers. For this he was banished, but returned (September, 1852) and became a leading figure in the independent Province of Buenos Aires. He served the province as commander of its army, Minister of War (1855), and Minister of Government and Foreign Relations (1857). In 1859 Mitre was defeated by Urquiza at Cépeda, but he refused to surrender unconditionally and accept the constitution formed on the basis of the Acuerdo de San Nicolás. Instead he opened a campaign in favor of a revision of the constitution which would save the rights of Buenos Aires and give the country a national organization on a solid and popular basis. In November, 1859, an agreement was made between the Confederation and Buenos Aires, by which the latter rejoined the Confederacy. The next year a Constitutional Convention formed a new constitution (September, 1860), to which Mitre swore as Governor of Buenos Aires and as an Argentine citizen (October 21). The abuses committed by the national government caused Buenos Aires to take up arms in defense of the constitution in 1861. Mitre led the provincial forces and defeated Urquiza in the battle of Pavon (q.v.)—the triumph of the party of Argentine liberty. This is considered Mitre's greatest service to his country. From March to October, 1862, he was *encargado* of the national power, in which position he assembled the Congress which completed the unification of the Argentine nation. In the latter month he was unanimously elected President. He carried out the constitutional reorganization of the country, fostered internal improvement, and encouraged foreign immigration. He failed, however, to secure the federalization of the city of Buenos Aires. Upon the outbreak, in 1865, of the war of Paraguay with Argentina, Brazil, and Uruguay, Mitre joined in a coalition against the Paraguayan dictator

Francisco López (q.v.) and was in command of the allied forces until 1867. Defeated for re-election, he founded and edited for many years *La Nación*, a leading newspaper of Buenos Aires. He was elected Senator and in this position displayed remarkable powers of oratory. Having been defeated by corrupt methods in the presidential election in 1874, he led an ineffectual revolt, for which he was court-martialed and exiled, but he received an amnesty the following year. From 1878 to 1880 he served as deputy in the national Congress and in the latter year led the defense of Buenos Aires in a minor revolt. He actively opposed the administration of President Celman (1886–90) and was popularly acclaimed candidate for the canvass of 1892, but withdrew and joined Ex-President Roca in the support of Luis Saenz Peña, who was selected. He was again candidate for the presidency in 1898, but withdrew, and afterward was elected to the Senate, of which body he served as president. During his active career he devoted much time to literature; indeed, he ranks as one of Argentina's greatest writers. His *Historia de Belgrano y de la independencia argentina* (1857; 5th ed., 4 vols., 1902) and *Historia de San Martín y de la emancipación sud-americana* (1869; 3d ed., 6 vols., 1907) are the best accounts of the South American wars of independence. There is an abridged translation in English of the *Historia de San Martín*, entitled *The Emancipation of South America* (London, 1893), by W. Pilling. Mitre's speeches were collected as *Arengas* (3d ed., 3 vols., 1902). He also published *Rimas* (new ed., 1890); *Uldrich Schmidel, primer historiador del Río de la Plata* (1890); and many other works. Consult J. J. Biedma, *El Teniente General Bartolomé Mitre*, in Bartolomé Mitre, *Arengas*, vol. iii (Buenos Aires, 1902).

MI'TRE, THE. A former London tavern, the favorite meeting place of Dr. Samuel Johnson, Boswell, and other celebrities. It stood on Fleet Street, and other well-known taverns of the same name were situated on Wood Street and Fenchurch Street, both destroyed in the great fire of 1666.

MI'TRE SHELL. A gastropod of the genus *Mitra*, family Mitridæ. The shells are very beautiful and much prized by collectors, the favorite being the bishop's mitre (*Mitra episcopalis*). The shell is turreted, smooth, white, spotted with bright red; pillar four-plaited; outer lip denticulated at its lower part; epidermis thin. It is found in East Indian seas. In this genus the shell is fusiform, thick; spire elevated, acute; aperture small, notched in front; columella obliquely plaited; operculum very small. The animal has a very long proboscis, and when irritated emits a purple liquid having a very offensive smell. Over 400 recent and 100 fossil species have been described. These mollusks are found at depths varying from the surface to 17 fathoms, on reefs, sandy mud, and sands. All are inhabitants of warm countries, notably the East Indian and Philippine regions.

MITROWITZ, mĭt'rō-vĭts, or MITROVICZA, mē'trō-vē-chō. A town of south Hungary, in the County of Szerem, on the Save, 43 miles west of Belgrade (Map: Hungary, F 4). On the opposite shore is the Servian town of Mitrovica. The chief industries are tanning leather and silkworm culture. It has a considerable trade in grain, fruit, and wine, and contains ruins of the old Roman city of Sirmium. Pop., 1900, 11,518; 1910, 12,909.

MITSCHERLICH, mĭch'ĕr-lĭk, EILHARDT (1794–1863). A German chemist, born at Neuende, near Jever. In 1811 he proceeded to the University of Heidelberg, where he devoted himself to history and philology and especially to the study of Persian. In 1814 he published a work on Persian history. In the same year he decided to take up the study of the medical sciences, and while working in chemistry under Link at Berlin he first observed the similarity in the crystalline form of phosphates and arsenates of similar chemical composition. He then set to work measuring crystals of a large number of substances, and was able to establish, in 1819, the principle of *isomorphism*. (See ATOMIC WEIGHTS.) The importance of the discovery was fully recognized by Berzelius, on whose invitation Mitscherlich went to Stockholm, remaining there until 1821. In the following year he was made professor extraordinary, and in 1825 full professor, in the University of Berlin. One of his earliest discoveries after his appointment was that of the occurrence of sulphur in two different crystalline forms—the first observed case of "dimorphism." He further discovered selenic and permanganic acids and nitrobenzene, and studied the formation of ethers, the phenomena of fermentation, etc. His principal work is his *Lehrbuch der Chemie* (1829–35; 4th ed., 1840–48). His papers on various scientific topics appeared in Poggendorff's *Annalen*, in the *Annales de chimie et de physique*, and in the *Abhandlungen* of the Academy of Berlin. A complete edition of his works was published at Berlin in 1896. Mitscherlich was an honorary member of almost all the great scientific societies and received the gold medal from the Royal Society of London for his discovery of the law of isomorphism. Consult Rose, *Eilhardt Mitscherlich* (Berlin, 1864). See CHEMISTRY, section on *History*, paragraph *General Chemistry*.

MITSUKU'RI, KAKACHI (1857–1909). A Japanese zoölogist, born at Edo. In 1873 he came to the United States, where he received the Ph.D. degree from Yale in 1879 and from Johns Hopkins in 1883. He was appointed professor in the science department of the Imperial University of Tokyo in 1882 and councilor of the university in 1893. In 1896 he was made head of the fur-seal commission and signed, on behalf of Japan, a treaty with the United States and Great Britain. In 1901 he became dean of the College of Science of the Tokyo University and in 1907 was decorated with the Order of the Sacred Treasure in recognition of public service. In later life his time was largely occupied with administrative duties. He was regarded not only as one of the leading zoölogists of Japan, but also as most influential in public life. His most important zoölogical publications, a series of papers on the embryology of the turtles, appeared at intervals from 1886 to 1896.

MITTAG-LEFFLER, mĭt'tàg-lĕf'lĕr, MAGNUS GUSTAF, BARON VON (1846–). A Swedish mathematician, born at Stockholm. He studied mathematics at Upsala and later in Paris under Weierstrass and in Berlin. He began his teaching as docent at Upsala in 1872, after having obtained the doctorate there the same year, and five years later became professor of mathematics at Helsingfors. In 1881 he was made

professor of mathematics at the University of Stockholm and subsequently was several times its rector. He was made a member of the Academy of Sciences of Sweden in 1883. His mathematical contributions are connected chiefly with the theory of functions. In 1882, under the patronage of King Oscar, he founded the *Acta Mathematica*, at present one of the leading mathematical journals of the world. The historical part of this journal has since 1887 been published separately by Eneström as the *Bibliotheca Mathematica*. It was Mittag-Leffler's appreciation of Sonya Kovalevsky's (q.v.) work that took her to Stockholm.

MITTERMAIER, mĭt'ĕr-mī'ĕr, KARL JOSEPH ANTON (1787–1867). A German jurist, born in Munich and educated at the universities of Landeshut and Heidelberg. He was a professor at Bonn for two years (1819–21), but the rest of his life was passed as professor of law and jurisprudence at Heidelberg. For many years he was a member of the Baden Legislature, and in 1848 he was President of the Frankfort Vorparlament, serving afterward as representative of the city of Baden in the German National Assembly. His greatest claim to distinction lies in his extensive writings on jurisprudence, among which is a complete manual of criminal law, *Das deutsche Strafverfahren*, and he was an earnest advocate of reform in the German criminal procedure and in prison discipline. The number of his published writings is very large, including many treatises on branches of law, discussions on all the important questions of his time connected with jurisprudence, and especially on trial by jury and the penal code. His principal works have been translated into many languages. He himself translated Francis Lieber's *Letter on Anglican and Gallican Liberty*, and edited the German translation of the same author's *Civil Liberty*.

MITTERMAIER, (GEORG GOTTFRIED) WOLFGANG (1867–). A German legal scholar and criminologist, the grandson of K. J. A. Mittermaier. He was born in Heidelberg and was educated there and in Berlin, and traveled in the United States, England, France, and Austria. He lectured on criminal law at Heidelberg in 1896 and became professor there in 1899, at Bern in 1900, and at Giessen in 1903. Among his published works are: *Die Militärstrafgerichtsordnung* (1899); *Amerikanische Reformatories* (1901), based on his own observation; *Kritische Beiträge zur Lehre von der Strafrechtsschuld* (1909); *Wie studiert man Rechtswissenschaft?* (1910).

MITTERWURZER, mĭt'ĕr-vụrts'ĕr, ANTON (1818–76). A German opera singer, one of the greatest barytone interpreters of the works of Gluck, Marschner, and Wagner. He was born at Sterzing in the Tirol, made his first theatrical appearance at Innsbruck, and at 21 was engaged at Dresden, where he stayed for 30 years and greatly influenced operatic methods. Mitterwurzer was at his best in such Wagnerian rôles as Wolfram, Telramund, and Hans Sachs.

MIT'TIMUS (Lat., we send). A written warrant or mandate issued by a competent judicial officer, directing a proper officer to convey safely the body of a prisoner to some jail or place of confinement and commanding the warden to receive and keep the prisoner for a certain time, or until released by due process of law. The act of sending the prisoner to prison is termed the commitment, and this latter term is now commonly employed to describe the warrant also. Any officer who disobeys such a command is guilty of contempt of court. See COMMITMENT; ARREST.

MITTU, mĭt'tōō. An agricultural Negro tribe, akin to the Bongo and living on the upper Nile in southern Sudan between lat. 5° and 6° N. In addition to the Mittu proper the term is also applied to a number of neighboring groups allied in speech and customs though politically independent. Of these the Madi, Madi-Kaya, Abbakah, and Loobah are mentioned by Schweinfurth. They are of earthy red-brown color and below the middle stature, but muscular. The hair is short and crisp. The lighter color of the skin would indicate a type of Hamite blood; but they are all pagans, like the other negroes about them, and little affected by Mohammedanism. Goats, fowls, and dogs are their domestic animals. At certain seasons of the year they are engaged in hunting and fishing. The costume of the Mittu consists only of a fringed apron; but they are fond of decorating their hair and parts of the body, such as the neck, arms, and lips, with ornaments. Their weapons are bows and arrows, with jagged, murderous points. Culturally they are most closely related to the Bongo and seem to form an intermediate link between them and the Azande (Niam-niam). They are markedly musical, with a considerable sense for melody; among their instruments are the lyre, flute, and trumpet. Consult Georg Schweinfurth, *The Heart of Africa* (2 vols., New York, 1874).

MITTWEIDA, mĭt'vī'dȧ. An industrial town of Saxony, Germany, situated on the Zschopau, about 30 miles west-southwest of Dresden (Map: Germany, E 3). It has important manufactures of cotton and woolen goods, cigars, cement, machinery, and furniture. Its institutions include a Realschule and a technical school. Pop. (including Rössgen), 1900, 16,119; 1910, 17,800, chiefly Protestants.

MITYLENE, mĭt'ĭ-lē'nē. An island of the Ægean. See LESBOS; MYTILENE.

MIVART, mī'vart, ST. GEORGE JACKSON (1827–1900). An English zoölogist, born in London, Nov. 30, 1827. He was educated at Harrow, at King's College, London, and then, having become a Catholic in 1844, at St. Mary's College, Oscott. He was called to the bar at Lincoln's Inn in 1851, but in 1862 became lecturer on comparative anatomy and zoölogy at St. Mary's Hospital, London. From 1890 to 1893 he held the chair of the philosophy of natural history at the University of Louvain, Belgium. In 1879 he was president of the biological section of the British Association. A most careful and competent anatomist and zoölogist, he wrote a large number of very important memoirs, especially upon the morphology and classification of vertebrates, and contributed largely to the discussion of the question of evolution. He was probably the most learned and powerful critic of Darwin and Huxley in minimizing the effect of natural selection as a factor of evolution and in insisting upon the existence of the guiding action of divine power, especially in the development of man's intellect and spiritual instinct. He distinguished, however, between absolute and derivative creation, maintaining that evolution operated only by means of the latter. His strength lay in natural science, and in this department he held a position of unquestioned eminence.

His efforts to reconcile the facts of science with the doctrines of religion aroused widespread attention. In the field of philosophy he published a number of works, such as *Lessons from Nature as Manifested in Mind and Matter* (1876); *Nature and Thought* (1882); *On Truth* (1889); *The Groundwork of Science: A Study of Epistemology* (1898). He claimed an increasing freedom of thought, which ultimately took him beyond what were considered in the Church the bounds of permissible speculation. After a series of magazine articles (1885–1900) dealing with the relations between science and faith, he was finally excommunicated by Cardinal Vaughan in January, 1900. He died April 1 of the same year in London. His more important works in natural science are: *The Genesis of Species* (1871); *Man and Apes* (1873); *The Common Frog* (1874); *The Cat* (1881); *Dogs, Jackals, Wolves, and Foxes* (1890); *American Types of Animal Life* (1894). His *Essays and Criticisms* (2 vols.) appeared in 1892.

MIWOK STOCK, or **MOQUELUMNAN.** A linguistic family of Indians in California consisting of the Miwok, Marin, and Middle Town tribes, now numbering 700. Consult A. L. Krober, in *American Anthropologist*, vol. viii (Lancaster, Pa., 1906), and S. A. Barrett, *Geography and Dialects of Miwok Indians* (Berkeley, Cal., 1908).

MIXED CADENCE, IN MUSIC. See HARMONY, *Cadences.*

MIXED RACES. Races which are blends of various other races. Of the factors which have been most potent in producing the varieties of man which we find on earth to-day, probably environment and crossbreeding must be assigned the first place. Unfortunately, neither one has been investigated with sufficient care to allow an accurate estimate of its specific influence. Further, the lack of any agreement among anthropologists as to a classification of human races complicates the problem, and until that agreement is reached confusion in the discussion is inevitable.

Certain general observations may, however, be permitted. With regard to crossbreeding it is undoubted that extensive migrations, with consequent blood mixtures, have been going on for an indefinite period. Accurate observation of anatomical and physiological characteristics of certain rather restricted groups, as in Europe, reveals a variability in these characters which has led some observers to conclude that a pure race does not exist at the present time. Recognizing these disturbing facts, however, any one will admit that there are certain types which are relatively permanent. We regard the fair white European as differing permanently from the negro, and both of these equally permanently from the typical Mongol. It is also a matter of common observation that mixture of any two of these types will produce a third, less distinctive, of course, but not to be included in either parent type. The real problem of hybridity as applied to man then arises: Are these subtypes permanent and fertile, or do they tend to revert to either one or the other of the parent types? It is here that the lack of accurate knowledge referred to above prevents positive statement. Early reports as to lack of fertility of certain half-breeds, as in the case of English and Australians, have been shown upon examination to be erroneous or the apparent sterility due to nonessential factors; and recent observations on half-breed American Indians actually show an increase rather than a decrease in fertility. Looking at the question broadly, it would seem that the evidence, while extremely scanty, points towards the view that any two races (however defined) can unite to form a third; and this in turn with others, until we have a confusion of strains and types in which the originals are indistinguishable, wholly or partly, which is apparently precisely the condition which we find to-day in various regions of the world. An authoritative catalogue of the existing mixed races of the world is therefore impossible. The most notable are probably the well-known mulatto, or cross between European and negro; the mestizo, so called, or cross between European and American Indian; and the complex mixtures which we find in the East Indian Archipelago, where Chinese and Malayan traits predominate.

The social significance of race mixture is of course very great, but the complicating factors in this aspect of the question are even greater than on the physical side. We find here two schools ardently advocating diametrically opposed views both as to the advantages or disadvantages of racial mixtures as well as to the mode of transmission of the characteristics of the parent stocks. The whole problem is involved in the general zoölogical problem of evolution and heredity, and unassailable ground as to the points involved cannot be assumed until a much wider range of facts is at our disposal and the disputed questions of inheritance in general have more nearly approached solution.

Prof. Eugen Fischer has recently studied the Hottentot-Boer breeds of German Southwest Africa and arrives at a relatively favorable interpretation of this hybrid race, both as to vitality and social characteristics. In America an optimistic view as to miscegenation is held by Prof. Franz Boas. Consult: Franz Boas, *The Mind of Primitive Man* (New York, 1911), and Fischer, *Die rehobother Bastards und das Bastardierungsproblem beim Menschen* (Jena, 1913). See CROSS BREEDING IN MAN.

MIXES. See ZOQUE.

MIXOG'AMY (from Gk. *μιξο-, mixo-*, mixed, from *μιγνύναι, mignynai*, to mix + *γάμος, gamos*, marriage). A term describing the breeding habits of most fishes, where the males and females congregate on the spawning beds and the number of the former sex is greatly in excess. The same habit has been observed in gars (*Lepidosteus*). On the other hand, the stickleback (*Gasterosteus*) is truly polygamous, several females depositing their eggs in the same nest, guarded by one male only. Some bony fishes (*Ophiocephalus*, and probably all chondropterygians) are monogamous, as probably are all the viviparous fishes. Consult Albert Günther, *An Introduction to the Study of Fishes* (London, 1880).

MIXOPHYTE. A term applied to plants of such a plastic nature that they are able to live either independently as autophytes or dependently upon dead organic matter as saprophytes. See AUTOPHYTE; SAPROPHYTE.

MIXTEC, or **MISTEC,** mē-stĕk'. An important Mexican tribe of high culture occupying eastern Guerrero and northwestern Oaxaca. In culture they resembled their southern neighbors, the Zapotec. Like them they were skilled in agriculture, pottery, and weaving, built temples

of hewn stone, kept hieroglyphic records, and had a calendar system. They still keep themselves apart from the political affairs of Mexico and maintain some of their old arts. The population is well over 200,000 and the language is believed to constitute a distinct stock, although often grouped with the Zapotec. The name is Aztec and means 'cloud people.'

MIXTURE (OF., Fr. *mixture*, from Lat. *mistura*, mixture, from *miscere*, to mix). An aqueous preparation of an insoluble substance held in suspension by a suitable vehicle. Among the mixtures used in medicine are those of chalk, of rhubarb and soda, and the compound mixtures of iron and of glycyrrhiza (licorice).

MIXTURE. An organ stop, consisting of from three to six ranks of small metallic pipes. It is generally found in large organs, and resembles the sesquialtera and furniture stops, except that it is much higher and shriller. Like other compound stops, the two smaller ranks of the mixture stop change on the upper part of the organ scale into an octave lower. This is necessitated from the fact that the pipes in their upper ranks would produce too small a volume of sound. The mixture can be used only in forte and fortissimo passages, as otherwise the harmonics would be heard too prominently.

MIYA, mē'yȧ (Jap., august house). A term sometimes applied to the mansions of Japanese princes, but more commonly denoting the shrines of the Shinto religion. These buildings represent the ancient cabins of the primitive Japanese modified by the progress of civilization and by Buddhistic influence. The earth floor of the hut is replaced by wooden flooring raised 2 or 3 feet from the ground, necessitating steps at the entrance. A veranda going completely round the edifice has been added. The sides of the hut were made of mats, but the shrine has walls of wood. The roofs were originally thatched, but are now covered with shingles, tiles, or even copper. In many shrines Buddhist influence has led to much decoration, but the characteristic of the true miya is extreme simplicity. It contains neither picture, image, nor altar, but only a mirror, or in some instances a pillow for the god. Before the shrines is the *torii* (supposed to signify 'bird rest'), which is sometimes taken for a gateway by tourists. Often many of them are placed before a single shrine. From a cord which hangs above the entrance are suspended *go-hei*, paper cuttings, representative of the offerings of cloth which were made in ancient times. Services are infrequent, usually not oftener than once or twice a year, and in some shrines there are no ceremonies. In 1908 there were 130,258 miya in existence, most of them tiny constructions and only a few of wide reputation. The shrines are divided into four classes —national, provincial, prefectural, and local— and a few are supported in meagre fashion by funds from the Imperial treasury.

MIYÁDZŬ, mē-yäd'zŭ. The most important town of the Japanese Province of Tango in San-in-do (Hondo), 87 miles northwest of Kyoto (Map: Japan, D 6). It was the residence in feudal times of Matsudaira, one of the three daimyos who ruled the province. Pop., about 10,000. In the vicinity, near Ama-no-hashidate (heaven's bridge) is a narrow tongue of land which juts out into the sea in a way much admired by the Japanese.

MIYAJIMA, mē'yȧ-jē'mȧ (temple island), sometimes called ITSUKUSHIMA. A small, beautifully wooded island in the Bay of Hiroshima, Japan, celebrated as the site of one of the most ancient Shinto shrines of the country. The temple is dedicated to the goddess Benten, worshiped by women for attractiveness and easy childbirth and by men for wealth. It was built in the year 527. The island is also notable for its deer and the absence of dogs. Priests, image carvers, fishermen, and innkeepers make up the population.

MIYAKO, mē'yä'kŏ. Another name for Kyoto, a city of Japan.

MIZON, mē'zôn', LOUIS ALEXANDRE ANTOINE (1853–99). A French naval officer and explorer in Africa. He was born in Paris, studied at the Naval School (1869–72), and in 1877 was sent out to accompany Brazza on his expedition to the region of the Ogowai River in the Congo region. He was stationed at Franceville for six years, and in 1886 he published charts of the Ogowai. Four years afterward he was sent to Adamawa, where he promoted French commercial interests in the Niger country and greatly irritated Great Britain. The latter power in 1893, after Mizon had made a treaty with the Sultan of Hamarua, declared Hamarua a British protectorate and forced Mizon's recall. In 1895 he was made French Resident at Majunga in Madagascar. He died when on his way to take up the duties of Governor of the colony at Jibuti in French Somaliland.

MIZ'PAH, or **MIZ'PEH** (Heb., watch, outlook). The name of several places in Palestine, of which the most important are: 1. The heap of stones and pillar set up by Jacob and his brethren as a witness of the covenant between Jacob and Laban. It was also called Galeed by Jacob and Jegar-sahadutha by Laban (Gen. xxxi. 44–49), the latter being the western Aramaic rendering of the Hebrew *gal-'ed* (heap of testimony). The narrative points to the existence of a sanctuary in Galeed which was known as Mizpah. The pillar and the heap of stones are to be regarded as objects for the cult—the former a Baal symbol, the latter a boundary stone, serving also as an altar. It was at this sanctuary that Israel was encamped before the conflict with the Ammonites (Judg. x. 17), which, as Gen. xxxi. 25 informs us, lay in Gilead (upon which Gal-ed represents a play). The indications in the Old Testament are insufficient for determining the site of the place with certainty. It lay north of the Jabbok, and perhaps near the modern Jerash, which answers the conditions involved. 2. The place in the territory of Benjamin where Israel gathered before punishing the tribe of Benjamin for their outrage on the concubine of the Levite at Gibeah (Judg. xix–xx), and probably also the place where Samuel assembled Israel to resist the Philistines and subsequently to present Saul as King (1 Sam. x. 17 et seq.), though it is also possible that the two places may be distinct. The location is not certain. It may be a point on the mountain ridge north of Shafat. These gatherings again indicate the presence of a sanctuary at Mizpah, and the continued importance of the place is made manifest by its choice as a seat of government under Gedaliah (2 Kings xxv. 23; Jer. xl. 6). In postexilic times we meet with references to Mizpah, and it is of special interest to note that in the days of the Hasmonæans Mizpah again becomes a gathering place for the Jews (1 Macc. iii. 46). Besides these two Mizpahs there are references

in the Old Testament (*a*) to the land of Mizpah (Josh. xi. 3) and the valley of Mizpah (ib., xi. 8), which are identical. This Mizpah is mentioned in connection with the battle of Merom (q.v.), and may be located near Hermon. A fourth Mizpah was situated in the "lowland" of Judæa (Josh. xv. 38), and a fifth in Moab (1 Sam. xxii. 3). The use of Mizpah as an inscription for memorial rings is based upon the words occurring in connection with the setting up of the "heap" of stones by Jacob and his brethren: "The Lord watch between me and thee" (Gen. xxxi. 49).

MIZ'ZEN, or MIZ'EN. See MAST.

MJÖSEN, myē'zen. The largest lake in Norway, situated in one of the most fertile valleys of the country, 36 miles northeast of Christiania (Map: Norway, D 6). Its length is 62 miles, its width averages only 2 and nowhere exceeds 10 miles. It receives the Laugen River at Lillehammer and empties its waters through the Vormen and the Glommen into Skager Rack. Its depth is remarkable, reaching in the southern part 1460 feet, its bottom being here 1050 feet below sea level. The vicinity of the lake is very popular as a summer resort, and steamers ply on it regularly during the ice-free season, which in the southern part, on account of its great depth, sometimes lasts throughout the year.

MLAWA, m'lä'vȧ (Russ. *Mlava*). A district town in the Government of Plozk, 46 miles northeast of Plock (Map: Russia, B 4). It is at the junction of the Marienburg-Mlawa and Kowel-Mlawa railways. It has five churches, a sixteenth-century town hall, a first-class customhouse, and is an important trade centre. Mlawa was founded in 1429 as an Imperial city, but declined rapidly after the wars with Sweden. Pop., 1910, 18,652. It was the centre of extremely heavy fighting during the European War which began in 1914. In the early part of the war it was captured by the Germans. They strongly intrenched their position, and several Russian attempts to recapture it were unsuccessful, although combined land and aërial attacks were resorted to. See WAR IN EUROPE.

MLYNARSKI, mlĕ-när'skė, EMIL (1870–). A Polish composer, born at Kibarty in Suwalki. He received his musical education at the St. Petersburg Conservatory, where Leopold Auer (q.v.) was his violin teacher. In 1889 he joined the orchestra of the Russian Imperial Musical Society at St. Petersburg and a few years later became instructor of violin at its Odessa branch. In 1890–93 he toured England and Germany as violin virtuoso. In 1898 he was appointed conductor of the Warsaw Opera House, from 1901 to 1905 was conductor of the Warsaw Philharmonic concerts, and in 1904–07 was director of the local conservatory. In 1908 he moved to London. He wrote violin music, pieces for the piano, songs, and operas. His violin concerto won the Paderewski prize at Leipzig in 1898.

MNÁ. See MINA.

MNEMONICS, nė-mŏn'iks. See MEMORY.

MNEMOSYNE, nė-mŏs'ī-nė (Lat., from Gk. *Μνημοσύνη*). In classical mythology, the goddess of memory, daughter of Uranus and Gaia. By Zeus she became the mother of the Muses (q.v.).

MNESICLES, nĕs'ī-klēz (Lat., from Gk. *Μνησικλῆς, Mnēsiklēs*). A Greek architect, who built the Propylæa (q.v.) of the Acropolis at Athens. His name was found on an inscription in its ruins, and Plutarch mentions him as its architect.

MNESTRA. See ERYSICHTHON.

MO'A (Maori name). A general name for a family (Dinornithidæ) of extinct ratite birds of New Zealand, some of which were of gigantic proportions. The existence of their remains and of legends among the Maoris relating to them was first published in 1838. The exploration of New Zealand revealed bones of these birds in great profusion, on the surface, in peat bogs, in seaside sand dunes, and in certain caves where the dry air had in some cases preserved not only the ligaments binding skeletal parts together but even pieces of dried skin and feathers, which still retained their chestnut and white colors, while footprints and broken eggshells have also been found. Prehistoric camping grounds furnish charred bones and fragments of eggshells.

The moas form a family more nearly associated in structure with the emus, cassowaries, and apteryx than with the ostriches. They were in organization nearest to the kiwis (*Apteryx*), but distinguished by their short beaks and by having aftershafts upon the feathers. They attained not only to great numbers and size in the isolation of New Zealand, but to a remarkable variety, some 20 species being now recognizable. Some were not larger than turkeys, and these perhaps may have had some vestiges of wing bones; but the longer moas were not only wingless but entirely destitute of any shoulder girdle whatever. In Canterbury College, Christchurch, South Island, New Zealand, the museum contains a moa room in which stand two splendid specimens of the *Dinornis maximus*, 12 feet, 3 inches high, as well as other specimens ranging from the size of a small emu to that of a giraffe. That the moa, although now extinct, existed at one time in very considerable numbers may be inferred from the fact that a search expedition by Dr. von Haast in the year 1866 obtained enough bones of this gigantic bird to fill an immense wagon. For a long time —indeed until very recently—it was believed that living specimens of the moa might still be discovered in that almost inaccessible mountainous region on the southwest and westernmost coasts of Otago, where even the Maori, in all probability, never penetrated. The expedition of Herr Reischek, the Austrian naturalist, who spent several months of the years 1887 and 1888 in that solitary country, pretty well dissipated this hope. In the genus *Pachyornis* the leg bones were short, massive, and extremely powerful, so that these are called the "elephant-footed" moas. Consult: Owens, *Extinct Birds of New Zealand* (London, 1879); Alfred Newton, *Dictionary of Birds* (New York, 1893–96); Walter Rothschild, *Extinct Birds* (London, 1907); F. A. Lucas, "Animals of the Past," in *American Museum of Natural History, Handbook Series, No. 4* (New York, 1913). See ÆPYORNIS; EXTINCT ANIMALS; EXTINCTION OF SPECIES.

MO'AB. The name given to a people occupying the high table-land east of the Dead Sea and the southern section of the Jordan (Map: Palestine, E 5). The southern boundary was Edom; the eastern, Ammon and the desert; the northern shifted from time to time, but in general was marked by a line some miles beyond the northern extremity of the Dead Sea. This land of Moab is a plateau from 3000 to 4000 feet above the Mediterranean Sea. The western slopes are gen-

erally steep and the aspect of the Moabite Mountains rising to the plateau is barren. It has streams in abundance; besides the Arnon, which divides the plateau, springs and brooks intersect the country. Numerous ruins testify to the former prosperity of the district, while the hundreds of rude stone monuments (stone circles, dolmens, cairns) show that it was densely settled in very early days. According to the biblical account, Moab, the eponymous ancestor of the Moabites, was a son of Lot by one of his daughters (Gen. xix. 37). This story, which traces both Moab and Ammon to an incestuous connection, may be a bit of tribal slander by Hebrew writers to throw discredit on their hated rivals and foes. (See LOT.) The close affiliation, however, between Hebrews and Moabites, which is indicated by the story, is correct. Not only was the language of Moab practically identical with Hebrew, but Moabites and Hebrews belong to the same branch of the Semitic stock, and for an indefinite period Hebrew and Moabitish history form an inseparable unit. The story of the separation of Abraham and Lot embodies a reminiscence of a union once existing between Hebrew and Moabitish clans which was dissolved by a quarrel over land. The land of Moab was included in the Egyptian supremacy over western Asia in the period from the seventeenth to the thirteenth century B.C., and the name Moab occurs in a list of conquests inscribed by Rameses II (1310–1244 B.C.) on one of his monuments at Luxor. The relations between Moab and Israel during the portion of Hebrew history known to us were generally hostile, and this hostility is traced back by tradition to the days of the Exodus (cf. Deut. xxiii. 4–5), but the oldest document we have regarding Moab is a fragment of a song (Num. xxi. 21–30) recalling a victory of the Amorites over Moab and the subsequent defeat of the Amorites by the Hebrews. The song, which bears marks of antiquity, may date from the early struggles of the Hebrews, anterior to the attempts of the latter to conquer Canaan to the west of the Jordan. On the other hand, the story of the endeavor of Balak, King of Moab, to secure the services of Balaam to curse Israel (Num. xxii–xxiv) is looked upon by many scholars as later than this invasion of Canaan, based upon the persistent hostility between Israel and Moab, and illustrating the invincible character of the former; while the apparent allusions to David and his conquests seem to indicate the age which produced the famous oracles. (See BALAAM.) After the conquest of Canaan the Hebrews were frequently at the mercy of the Moabites, as well as of Ammonites and Amalekites. We learn of a King Eglon of Moab, who held the Hebrews in subjection for 18 years (Judg. iii), from which they were freed by Ehud, a Benjaminite. Saul appears to have held the Moabites in check, while under David they actually became tributary to the Hebrews. It is not known whether Moab used the opportunity furnished by Jeroboam's revolt to secure its independence, or paid tribute to Israel after its separation from Judah. But from Mesha's inscription (see MOABITE STONE) we learn that Moab was oppressed by Israel for 40 years in the reigns of Omri and his son, and that in the middle of Ahab's reign the yoke of Israel was thrown off (c.860 B.C.). From that time on Moab seems to have maintained its independence of Israel, and had its own kings.

Salmanu paid tribute to Tiglath-pileser IV in 733; Moab took part in the revolt of Ashdod against Sargon II in 711; Kamoshnadab paid tribute to Sennacherib in 701, and Muzura to Esarhaddon and Asurbanipal. Subsequently Moab became tributary to Babylonia. In post-exilic sections of the books of Isaiah and Jeremiah we find references to Moab which point to the continued existence and, in a measure, prosperity of the country, but otherwise throw no light upon its history. The name lingered on into the Christian era. During the Roman occupancy of Palestine the land of Moab was still densely inhabited, as the Roman and Greek remains show, but gradually the Arabs of the desert overran it, and what culture once existed there came to an end. It remained for modern travelers like Seetzen and Burckhardt to rediscover it. The chief god of the Moabites was Chemosh (q.v.), and their religion, so far as we know it, bore the characteristic marks of early Semitic cults.

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MO'ABITE STONE, THE. A stone bearing an inscription of 34 lines in the Moabitish language, discovered in 1868 by the German missionary F. Klein at Diban in Moab. He took no copy of the inscription and gave no description of its contents. The negotiations set on foot for the purchase of the stone by Clermont-Ganneau, attaché of the French consulate at Jerusalem, who had also learned of the existence of the stone, led to quarrels among the Arab tribes claiming an interest in it, and the monument was unfortunately broken to pieces. The fragments, however, were with great difficulty collected, and are now preserved in the Louvre. Prior to the destruction of the stone squeezes had been obtained by Clermont-Ganneau. Some of these were very imperfect, but one was good. From a study of the fragments and the squeezes Clermont-Ganneau was able to publish the text and the first translation. As the result of numerous researches by French, German, and English scholars, the decipherment may now be said to be complete. The characters on the Moabite stone are those of the North Semitic alphabet (see ALPHABET), and the language is so closely allied to Hebrew that the conclusion is justified which makes Hebrew and Moabitish practically identical, though with dialectical differences. The inscription itself refers to the deeds of Mesha, King of Moab, who is mentioned in the very first line, and the interest of the stone is greatly enhanced by the circumstance that he is identical with the Mesha (q.v.) spoken of in 2 Kings iii. 4. Mesha begins in his inscription by referring to the affliction which Moab endured under Omri, King of Israel, and the latter's son (i.e., Ahab, who, however, is not mentioned by name). We know from the biblical narrative that Moab was tributary to Israel during the reigns of Omri and Ahab. This is the "affliction" referred to and is attributed by Mesha to the anger of his deity Chemosh. Thanks, however, to Chemosh, who turned with favor to

Mesha, the latter regained the cities which Israel had captured. Mesha adds in an exaggerated manner that "Israel perished with an everlasting destruction." But while in 2 Kings iii. 5 the revolt of Moab is said to have taken place after the death of Ahab, line 8 of the inscription makes it clear that the 40-year period of Israelitish oppression ended in the middle of the reign of Ahab. Since Mesha knew the length of Ahab's reign, the stone must have been erected after Ahab's death (c.851 B.C.), probably in 849 B.C. The rest of the inscription is taken up with details of the conflict and with building operations undertaken by Mesha. Besides its historical significance the inscription is of geographical importance because of the many names of sites in Moab which it contains. As one of the oldest inscriptions in the North Semitic alphabet the Moabite stone has also great epigraphical value.

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MOALLAKAT, mō'ăl-lă-kăt' (Ar. *Mu'allaḳat*, the exalted ones). A *diwan*, or collection, of seven poems, made by Hammad, surnamed *al rawiya*, "the reciter." It consisted of what he considered the best poem of each of the following seven bards: 'Amru'l Kais, Tarafa, Zuhair, Labid, Antara ibn Shaddad, 'Amr ibn Kulthum, and Harith ibn Hilliza. Hammad lived in the first half of the eighth century. Ibn Abd Rabbihi (died 940) and Naḥḥas (died 949) both give the same list of the seven poets. But Ibn Kuteiba (ninth century) mentions also a poem of 'Abid among the Muallakat. Nabigha and A'sha enjoyed a reputation as poets quite equal to any of the seven, and later scholars, like Tibrizi (died 1109), therefore included in the list these two and 'Abid. Ibn Khaldun (died 1406) included also Al Kama, evidently confusing the Muallakat with the *diwan* of Al Alam, which contained a poem of each of the following six: 'Amru'l Kais, Zuhair, Tarafa, Nabigha, A'sha, and Al Kama. As for the title, Ibn Abd Rabbihi seems to have been the first to understand it literally of poems that were "suspended." Against this his contemporary, Naḥḥas, entered a protest, maintaining that the poems were so called because they were "lifted up," "exalted," "excellent." This view has been accepted in modern times by Hengstenberg, Sprenger, Nöldeke, Ahlwardt, and practically every Arabist, in place of the legend that the poems were hung up in the Kaaba, which is presented in its fullest form by Ibn Khaldun. The text has been published by Lyall, with the commentary of Tibrizi (Calcutta, 1894); Tarafa by Geiger in *Wiener Zeitschrift für die Kunde des Morgenlandes*, xix (Vienna, 1905), and Antara, with the commentary of Ibn al Anbari by Roscher in *Revista degli studi orientali* (Rome, iv, 1911; vi, 1913). Five of the poems were translated and interpreted by Theodor Nöldeke in *Sitzungsberichte der königlichen Akademie der Wissenschaften*, vols. cxl–cxliv (Vienna, 1900). Sir William Jones published the first English translation, *The Moallakat* (London, 1782); the most recent are those by F. E. Johnson, *Seven Arabic Poems* (ib., 1897), and Kennedy, *Pre-Islamic Poetry* (ib., 1908). See AMRU'L KAIS; AMR IBN KULTHUM; ANTAR, HARITH IBN HILLIZA; LABID; TARAFA; and ZUHAIR.

MOAT, mōt, (OF. *mote*, embankment, from ML. *mota*, mound, embankment, ditch, castle; probably connected ultimately with Bavarian *mott*, peat, Swiss *mutte*, turf). The ditch round the ramparts of a fortress, often filled with water as an obstacle against attack. See FORTIFICATION; CASTLE.

MOAWIYAH, mō'ă-wē'yâ (Ar. *Mu'āwiyyah*) (c.610–680). Caliph and founder of the Ommiad dynasty. He was born at Mecca, the son of Abu Sufian, the bitter enemy of Mohammed. He was made Governor of Syria by the Caliph Othman, and during his term of office conquered the island of Rhodes, but lost Cyprus. On the proclamation of Ali as the successor of Othman in 656 Moawiyah revolted and with the aid of the gifted Amr ibn al Asi attempted to make himself Caliph. He was defeated in several battles by Ali, who, however, was prevented by domestic rebellion and foreign war from completely crushing his rival. Moawiyah was proclaimed Caliph at Damascus, 656, and after the assassination of Ali in 661 he succeeded in speedily reducing the rest of the Empire to submission. His army, after making extensive conquests, was unable, after a long siege and repeated assaults, to capture Constantinople, and in 678 he entered into a treaty of peace with the Byzantine Emperor. Moawiyah not only exerted absolute control over the Moslem Empire, but succeeded in having the caliphate declared hereditary in his family.

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MOB. See CROWD.

MO'BERLY. A city in Randolph Co., Mo., 129 miles east by north of Kansas City, on the Missouri, Kansas, and Texas and the Wabash railroads (Map: Missouri, D 2). It has the division headquarters and machine shops of the Wabash Railroad, brickyards, flouring and planing mills, foundries and machine shops, ice, shoe, wagon, glove, furniture, and frame factories, culvert works, cement works, and a large grain elevator. There are valuable deposits of coal and fire clay in the vicinity. An extensive trade is carried on in agricultural and dairy products, lumber, live stock, poultry, hides, wool, tobacco, and, of the city's manufactured products, flour and bricks. Moberly has a Carnegie library, two fine parks, an attractive Federal building, two hospitals, and a convent school. The water works are owned by the city. Pop., 1900, 8012; 1910, 10,923; 1914 (U. S. est.), 12,162; 1920, 12,808.

MOBERLY, GEORGE (1803–85). An English

prelate, Bishop of Salisbury. He was born in St. Petersburg (now Petrograd), Russia, and was educated at Winchester and Oxford. In 1826 he took the Oxford chancellor's prize for the best English essay. After connection with Balliol College as tutor and fellow he was in 1835–66 head master of Winchester. He was then presented to the living of Brightstone in the Isle of Wight and in 1868 became a canon of Chester Cathedral. In 1869 he was consecrated Bishop of Salisbury. Although he belonged to the High Church party, in 1872 he urged omission of the damnatory sections of the Athanasian Creed (q.v.). Of his numerous published works the most important are: *A Few Remarks on the Proposed Admission of Dissenters to the University of Oxford* (1834); *Sermons Preached at Winchester College* (1844); *Sermons on the Beatitudes* (1860; 3d ed., 1870). In 1868 he delivered the Bampton lectures, which appeared under the title of *The Administration of the Holy Spirit in the Body of Christ.*

MOBERLY, Robert Campbell (1845–1903). An English theologian. He was educated at Winchester and at New College, Oxford; was senior student of Christ Church in 1867–80; and was ordained a priest of the Established church in 1870. He was head of St. Stephen's House, Oxford, in 1876–78; served in 1878–80 as principal of the Diocesan Theological College at Salisbury, where he was also chaplain to his father, George Moberly, Bishop of Salisbury; and became vicar of Great Budworth, Cheshire, in 1880. He was appointed professor of pastoral theology at Oxford in 1892 and was chaplain in ordinary to Edward VII in 1901. His writings include: an important paper on "The Incarnation as the Basis of Dogma" (1889) in *Lux Mundi; Sorrow, Sin, and Beauty* (1889; 2d ed., 1903); *Ministerial Priesthood* (1897; 2d ed., 1899); his chief work, *Atonement and Personality* (1901); *Christ our Life* (1902); *Problems and Principles* (1904).

MOBILE, mō-bēl′. The county seat of Mobile County, the only seaport of Alabama, 140 miles east by north of New Orleans (Map: Alabama, A 5). It lies where the delta of Mobile River (the Mobile, Spanish, Raft, Tensaw, and Apalachee rivers) empties into Mobile Bay, 26 miles north of the Gulf of Mexico, and is served by five railroads—the Louisville and Nashville, Southern, Mobile and Ohio, New Orleans, Mobile, and Chicago, and the Alabama, Tennessee, and Northern. Its total area of 17.51 square miles extends from the west bank of Mobile River westward to the last foothills of the Appalachian chain at Spring Hill. To the north are large gum and cypress swamps, barely at sea level, while land towards the gulf is generally low. The city's streets are laid out at right angles, and many are lined with beautiful white Colonial residences. In the business district are the new United States government building, the Mobile and Ohio station, the Battle House, the City Bank and Trust Company building, the Van Antwerp office building, the County Court House, and the City Hall, which was remodeled from an old Spanish market; also the Providence Infirmary, United States Marine Hospital, Mobile Infirmary, and Southern Infirmary. The cathedral of the Immaculate Conception, a good example of Gothic architecture dating from the French occupation in 1720, is the seat of the Bishop of Mobile. Christ Episcopal Church, with a severe Greek exterior, was built in 1835. Mobile still retains a large number of the philanthropic institutions for which it was famed before the Civil War, when it was the premier cotton-shipping port of the South. Chief among them are the Medical School of the University of Alabama and Spring Hill College, the latter a Jesuit institution of excellent repute, founded in 1830; while McGill Institute, the Convent of the Academy of Visitation, and Barton Academy (the city high school) are worthy of mention. It has three small libraries. Along the bay shore south of the city is Monroe Park; the other chief recreation centres are Washington Square, Lyons Park, and Bienville Square. Across the bay on the east shore are beautiful summer homes, a colony of the advocates of the Henry George single-tax system at Fairhope, while on the west shore are the summer resorts of Coden and Bayou le Batre.

Mobile thrives principally as a port from which the cotton, lumber, and naval stores of the surrounding country are shipped to Cuba, Europe, South and Central America. It has regular sailings to New York, Cuba, Porto Rico, Central America, South America, and Europe. A 27-foot channel leads from the mouth of the bay to the city docks. From 1911 to 1914 the city made many improvements along the water front, and in the creation of municipal docks which cover 1500 feet of water front. The magnificent Turner-Hartwell docks with double slips extend 1600 feet into Mobile Bay, and the city acquired a vast new frontage of dredged land when the channel of the bay was straightened in 1913. Its exports, chiefly logs, hewn timber, shingles, pine lumber, rosin, cotton, and cotton products, amounted in 1913 to $28,823,873. Imports, chiefly bananas, pineapples, sisal grass, asphalt, potash, and sulphur ore, totaled $3,675,180. It has several large cotton compresses, a number of large saw mills which turn out pine, gum and cigar-box lumber, and several very important machine shops and a shipbuilding yard. There are also a brewery, sash and blind factories, veneering plants, cotton mills, an agricultural chemical plant, and in the suburb are the main repair shops of the Mobile and Ohio Railroad. In 1910 Mobile as the second manufacturing city of Alabama had invested in her enterprises $5,250,000, which produced $5,429,000 of finished goods, or an increase of about 10 per cent in the decade. The farming in the vicinity is much diversified, ranging from cotton to corn, pecans, Satsuma oranges, cabbages and staple vegetables, which are raised in large quantities. Mobile is the centre of an important Gulf fish and oyster industry.

The budget of the city in 1914 was $494,080, the principal expenditures being $170,000 for interest on bonds; police, $76,500; fire, $68,000; streets, $82,000. The city owns the water works. Pop., 1860, 29,258; 1900, 38,649; 1910, 51,521, of which 22,763, or 44 per cent, were negroes or of negro descent; in 1920, 60,151.

Mobile was founded in 1702 by Bienville and d'Iberville at a point on the Mobile River north of the present city and known as Twenty-seven Mile Bluff. After experiencing the violent annual spring freshets in 1710 the city was moved to its present site in 1711. It was the capital of the French Province of Louisiana until 1720. In 1763 it was ceded to the English as part of Florida, but in 1780 the Spanish under Galvez captured it, and in 1783 the possession of Spain was confirmed by treaty. It became the property

of the United States under the Louisiana Purchase, and was captured in 1813 by Gen. James Wilkinson. It was the headquarters of Gen. Andrew Jackson in 1814. It was granted a city charter in 1819. It was an important point during the Civil War, and on Aug. 5, 1864, Admiral Farragut bombarded Forts Morgan and Gaines, defending the mouth of the bay, and, after sinking the Confederate ram *Tennessee*, attacked and destroyed the main body of the Confederate fleet under Admiral Franklin Buchanan. (See MOBILE BAY, BATTLE OF.) In the spring of 1865 the Union general Canby defeated forces under Gen. R. C. Gibson, and the Federals took possession of it April 12. After the Reconstruction period it was placed in bankruptcy in 1879 as the Port of Mobile. It received a new charter in 1887. In 1906 a severe southeast gale caused the inundation of lower parts of the city by water backed up in the bay. There were many lives lost and much property destroyed at Coden, Cedar Point, and along the south shore of the county. In 1911 a commission form of government under three commissioners was adopted.

Mobile claims the distinction of being the home of the Mardi-gras celebration in the United States. As Mother of Mystics a masked society known as the Cowbellian de Rakin Society was formed in 1830. This was succeeded by the Order of Myths and the Infant Mystics, which still continue with several other organizations their yearly balls and elaborate street parades. It was the home of Raphael Semmes, the famous Confederate captain; Augusta Evans Wilson, writer; and Father Ryan, the poet priest.

Consult: "Mobile," in L. P. Powell (ed.), *Historic Towns of the Southern States* (New York, 1900); P. J. Hamilton, *Colonial Mobile* (Boston, 1910); id., *Founding of Mobile, 1702–1718* (Mobile, 1911).

MOBILE BAY. The estuary of the Alabama and Tombigbee rivers (whose waters after their junction form the Mobile and Tensaw rivers), running into the Gulf of Mexico, through the southwest portion of the State of Alabama (Map: Alabama, B 5). It is about 27 miles long and has an average width of about 8 miles. The southern part of the bay, stretching about 14 miles eastward from the entrance, is known as Bon Secours Bay; this is shallow, with an average depth of 7 to 15 feet. The entrance to the bay proper, between Mobile Point and the east end of Dauphin Island, is about 2¾ miles wide, but is obstructed by a number of islands and shoals. The main channel is about ½ mile wide, and 26 feet deep. Depths within the bay range from five to eleven fathoms. The entrance is defended by Forts Morgan and Gaines, and on Mobile Point is a lighthouse with a revolving light. The bay has also an outlet on the southwest through Grant's Pass, communicating with Mississippi Sound, used by steamers of light draft, and the regular course of the Mobile and New Orleans steamers. See MOBILE BAY, BATTLE OF.

MOBILE BAY, BATTLE OF. A battle of the Civil War in America, fought Aug. 5, 1864, between a Federal fleet under Rear Admiral Farragut and the Confederate ram *Tennessee* aided by three auxiliary gunboats and the guns of Fort Morgan. When Farragut was ordered to the Gulf of Mexico in January, 1864, he wished to attack Mobile and effectually put an end to blockade running, but not until late in July was he assured of the support of a land force and of ironclads, without which the attack was likely to prove a failure. The city, 30 miles above the Gulf, was protected by Fort Morgan and Fort Gaines, respectively on the eastern and western sides of the entrance to the bay. The channel was closed by piles and torpedoes except for a narrow space under the guns of Fort Morgan. At seven o'clock on the morning of August 5 the four monitors *Tecumseh*, *Manhattan*, *Winnebago*, and *Chickasaw* began to fire upon the fort as they steamed past. They were followed by the wooden sloops *Brooklyn*, *Hartford* (flagship), *Richmond*, *Lackawanna*, *Monongahela*, *Ossipee*, and *Oneida*, to each of which was lashed a gunboat, to prevent it from drifting if disabled. When the *Brooklyn* was almost abreast of the torpedoes she stopped and began to back. The captain of the *Tecumseh* disobeyed orders, steering to the west of the open channel, and his vessel was blown up. As the *Brooklyn* turned across the channel, to prevent fouling, Admiral Farragut ordered the course directly across the torpedoes. Though the torpedoes were felt to strike the bottoms of the vessels, none exploded. Little damage was done by the guns of the fort and the Federal gunboats were released. Soon they sank the *Selma*, drove the *Gaines* aground and the *Morgan* under the guns of the fort, and the fleet prepared to anchor. The ram *Tennessee* coming out from the shelter of the fort attacked the entire Federal fleet. Though hit many times, and rammed by the *Hartford*, the *Monongahela*, and the *Lackawanna*, her armor suffered little damage, but her smokestack was shot away, her steering gear disabled, and her commander had his leg broken by a splinter. Her port shutters were so jammed that it was impossible to use her guns successfully and at ten o'clock she surrendered. General Granger had invested Fort Gaines, August 3, and on August 7 that fort surrendered. Fort Morgan was immediately invested and surrendered on August 23. No attempt was made to take the city at this time on account of the shoal water, but the port was effectually closed. The Confederate losses amounted to 12 killed, 20 wounded, and 280 taken prisoners. The Federals lost 52 killed, 170 wounded. To this should be added from the crew of the *Tecumseh* 93 drowned and 4 captured. Consult: Loyall Farragut, *Life of David Glasgow Farragut* (New York, 1892), and A. T. Mahan, *Admiral Farragut*, in "The Great Commanders Series" (ib., 1892).

MOBILE POINT. A name applied to the end of a long, narrow strip of sand which stretches between Navy Cove and the Bay of Bon Secours to the north and the Gulf of Mexico to the south, at the eastern extremity of the entrance to Mobile Bay. Fort Morgan is situated here, on the ground once occupied by Fort Bowyer (q.v.). Andrew Jackson repaired Fort Bowyer, on Mobile Point, and garrisoned it just in time for it to resist attack by the British on September 15, 1814. On Feb. 11, 1815, 34 days after the battle of New Orleans, a British force captured Fort Bowyer, but withdrew on April 1.

MOBILE RIVER. The west branch of the system of channels through which the united Alabama and Tombigbee rivers discharge into the head of Mobile Bay near the west shore. It is about 38 miles long, and communicates at several points with the Tensaw, or eastern branch of the system.

MOBILES, mō'bēl' (Fr. *garde nationale mobile*, usually called *garde mobile*). A body of

French troops created by law in 1868 and suppressed in 1872. It was composed of young men not included in the class with the colors; men exempt from these classes; men who had procured substitutes; and men who had served but who wanted to enlist anew.

MOBIL'IAN TRADE LANGUAGE. An Indian trade jargon formerly serving the same purpose of intertribal and trade communication in the Gulf States that is still served by the Chinook jargon (q.v.) along the Columbia and the northwest coast, by the *lingoa geral* in Brazil, and to a certain extent by the sign language (q.v.) of the plains. It was based upon Choctaw, with additions from all the neighboring dialects and from the more northern Algonquian languages, and was the common medium of communication among all the tribes of the Gulf region, from the Atlantic coast of Florida probably as far west as Matagorda Bay in Texas and northward along both banks of the Mississippi to the Algonquian frontier about the entrance of the Ohio. It was called *Mobilienne* by the French, from Mobile, the great trading centre of the Gulf region. Along the Mississippi it was sometimes known as the Chickasaw trade language. In an official report upon the Texas tribes in 1805 Sibley stated that the Mobilian was spoken in addition to their native language by all the Indians who had come from the east side of the Mississippi. It was still spoken in Louisiana 70 years ago, but has since died out with the general decay of the Indian life.

MOBILIER, mō'bē'yā', CRÉDIT, krā'dē'. See CRÉDIT MOBILIER.

MOBILIZA'TION (Fr. *mobilisation,* from *mobiliser,* to mobilize, from *mobile,* Lat. *mobilis,* movable, from *movere,* to move, Skt. *miv,* to push). The expansion, equipment, and concentration of the national military assets and the organization of the same into the larger tactical units prepared for immediate war service. The term is used to express the general preparation of both the army and the navy, but is more commonly employed with respect to the assembling of armies. For the navy mobilization includes placing in commission all ships held in reserve; receiving, equipping, and assigning the naval reservists; organizing the ships into divisions, squadrons, and fleets; supplying these with the necessary ammunition, coal, and with supply, repair, and hospital ships, etc., providing in general for creating and maintaining "fleets in being."

In continental Europe the national army in war is the "nation in arms," i.e., it is composed practically of the entire able-bodied male population, usually between the ages of 18 and 48. Since it is neither necessary nor possible, for economic reasons, to maintain permanently in peace the great forces that may be temporarily required in war, these Powers have adopted the system of a relatively small peace establishment capable of enormous expansion and rapid concentration when war is imminent. This expansion in size and concentration at threatened points is mobilization. The rapidity of mobilization is one measure of military efficiency, and an important one, for the reason that it affords the opportunity of securing the strategical and tactical advantages of the offensive. The number of trained soldiers and the rapidity of mobilization in any theatre of war are dependent on the form of government, whether centralized or decentralized; on population; on the national genius for military organization; on the general political policies with respect to neighboring nations; on geographical location; on the local terrain and number of roads and railroads to the theatre of war; on economic conditions; on the system of service in time of peace, compulsory or volunteer, employed in training men for war. All great nations except England and the United States have adopted the compulsory system of training in peace, so that in war such nations, without delay, can embody in a great war army civilians previously trained as soldiers. In England and the United States, where the volunteer system is used, there is no such large body of trained reservists. In order to meet any great national emergency they must depend upon the slow process of volunteer recruiting and training such recruits after war has been declared.

It is true that England, in the special and army reserve class, had trained volunteer reservists, but their number was insignificant compared with the numbers of conscript reservists available for the continental armies when the European War of 1914 began. Mobilization as technically understood in compulsory-service armies has no application in volunteer systems like that of England and the United States, for the reason that there is little or nothing in the way of trained reservists to mobilize, or put "in being." The word mobilization when used with respect to the American or English system would be understood as meaning rather a system of recruiting volunteer civilians and their assemblage in camps for equipment and training. In the Spanish-American War of 1898 it required nearly two months to mobilize and transport to Santiago the insignificant force of about 15,000 men. In the European War of 1914 England was able to mobilize for *immediate* use in France not more than four divisions, about 80,000 men, and at the end of six months about 720,000 men, of which about half were trained troops, the rest partially trained colonial and Indian contingents and volunteers recruited after the war began. In strong contrast were the wonderful systems of France and Germany. At the end of two weeks France had an active field army of at least 1,380,000 men; Germany an army of 1,850,000 at the end of six days. These were only the initial mobilizations. Later there followed other classes of reservists, until the number of trained or partly trained men totaled an estimated number of 4,400,000 for France and 5,300,000 for Germany. Owing to the extent of territory over which her reservists are scattered and the lack of railways to the German and Austrian frontiers Russian mobilization on those frontiers was much slower than that of Germany. Russia's regular army was estimated at about 1,200,000, with a potential mobilization of 1,850,000 in 30 days. Her ultimate strength in men might reach 7,700,000 provided she had the necessary arms and equipment. Austria's regular army is about 400,000; initial mobilization, in about three weeks, 820,000; ultimate strength, 2,200,000. Japan maintains a peace army of about 250,000; initial mobilization, 600,000; ultimate trained strength, 1,500,000. The United States could mobilize in the United States proper an incomplete field army of about 25,000 regulars in about two weeks and four incomplete divisions (80,000 men) of partially trained militia of doubtful value in about one month; total, 105,000 men in one month. As

there are no trained reservists, further effective increase could not take place until the volunteer recruits had been trained, possibly in six months. All the above figures are estimates for 1914–15. The exact strength in each case is known only to officers of the general staffs, who are extremely careful in their efforts to mislead their possible national enemies.

Details of Mobilization. The new French plan and detailed methods of mobilization, though frequently practiced in peace, had its first complete test in the European War of 1914. The scheme worked smoothly, efficiently, and successfully. The general plan provided: 1. In peace, detailed instructions for the guidance of each reservist; for all private owners of horses, wagons, and automobiles; for all civilian officials, especially the railway and telegraph personnel. 2. Upon the declaration of war, a proclamation of martial law throughout the country; the announcement and posting of a brief general mobilization order designating the days of mobilization and making the requisition for private transportation previously inspected and accepted; putting into effect the military train schedules; taking control of the telegraph and telephone lines; assuming the censorship of the press and military control of cafés selling intoxicating liquor; the supervision of prices asked for food products; etc. The decree of the President of the Republic proclaiming martial law, posted Aug. 2, 1914, read as follows: "The 86 Departments, the territory of Belfort, and the three Departments of Algeria are declared under martial law. Martial law will be maintained throughout the duration of the war." Under French law, "by virtue of martial law, the powers with which the civil authority is clothed for the maintenance of order and police pass at once and in their entirety to the military authority, and the civil authority exercises only those powers of which it has not been dispossessed by the military authority." The powers thus transferred include the right of search of houses, the removal of suspects and individuals without domicile in the district under martial law, the enforced surrender of arms and ammunition and right to search for same, prohibition of publications and assemblages likely to cause excitement and disorder, jurisdiction over crimes and offenses against the safety of the state, against the constitution, or against the public peace, whatever the rank of the principals or accomplices. Citizens continue to enjoy all the rights guaranteed by the constitution, except those which are expressly suspended.

Mobilization was announced to the inhabitants throughout France by posting a copy of the order in conspicuous public places. In the smaller towns and villages the people were assembled by the beating of drums, ringing of bells, etc., the order then being read by a gendarme or town official. Individual reservists in country districts were reached by telephone or messenger. The order was promulgated in the afternoon of August 1 and read as follows:

"The Army and Navy. Order for General Mobilization

By decree of the President of the Republic the mobilization of the Army and Navy is ordered; also the call for the animals, wagons, and harness necessary for the equipment of those forces.

The first day of mobilization is Sunday, Aug. 2, 1914

Every Frenchman liable for military service must, under penalty of being punished to the full extent of the law, obey the instructions of the mobilization section (see colored pages placed in his individual booklet).

There are included under the present order: *all* men not present with the colors, belonging:

1st. To the Army, including colonial troops and the men of the auxiliary services.

2d. To the Navy, including registered sailors and naval reservists.

Table Showing Calendar Dates of Mobilization Days

The *first day* of mobilization is Sunday, Aug. 2, 1914.

. . . . . .

The *fifteenth day* of mobilization is Sunday, Aug. 16, 1914."

By the promulgation of these two documents announcing martial law and general mobilization respectively the whole of France and Algeria passed smoothly and quickly from a status of peace to a status of war. Every French citizen liable for military duty dropped his work, consulted the colored pages of his individual instruction booklet, reported at a certain hour of a certain mobilization day at a designated railroad station for transportation to the headquarters of his regiment, where he was at once uniformed, armed, and equipped for service in the field with his organization. With equal ease and rapidity were assembled the vast number of animals, wagons, harness, and motor vehicles required for the armies being mobilized. The owner presents his property at a designated time and place, receives an order for the value previously agreed upon, and may, if he so desires, have this order cashed immediately by the local army paymaster. The civilian railway man, the telegraph operator, the business man, the doctor, donned a uniform and, in accordance with individual instructions received in peace, proceeded, if so ordered, with the practice of his business or profession under military control and for the sole benefit of the government or the army.

In the United States mobilization is accomplished as follows: If war appears imminent, mobilization camps are selected by the War Department for the organized militia and volunteers. The regular army is mobilized at its permanent stations. At the mobilization camps troops are assembled and raised to war strength, equipped, and prepared for service. Recruits for the regular army are assembled, equipped, and trained at the five permanent recruit depots (see Depot) and then sent to their organizations. Department (territorial) commanders are responsible that all military organizations leave mobilization points: (1) with the full equipment required by existing orders; (2) with sufficient rations and grain to supply them fully while en route; and (3) with two days' rations and grain for use after their arrival at the concentration camps. A concentration camp is a place near the scene of intended operations or near an embarkation point, where troops are assembled for immediate use against the enemy or for transport to an over-sea theatre of operations.

Consult "Pages d'histoire," in *Mobilisation*, Librairie Militaire (Paris, 1914); *Field Service Regulations, U. S. A.* (Washington, 1914). See CAMP; FRONTIER; *Army* sections under countries.

MÖBIUS, mē'bē-ụs, AUGUST FERDINAND (1790–1868). A German mathematician, born in Leipzig. He studied at the universities of Leipzig and Göttingen. At first he devoted his attention to law, but later, under the influence of Gauss, he took up mathematical astronomy. In 1816 he was made professor at Leipzig and almost immediately afterward became director of the observatory in the Pleissenburg, which was built after his plans (1818–21). His important astronomical and mathematical memoirs appeared from this time on in the *Astronomische Nachrichten*, Crelle's *Journal*, and the *Berichte* of the Scientific Society of Leipzig. His leading mathematical work was *Der barycentrische Calcul* (1827). This contained a novel discussion of homogeneous coördinates, presented the first systematic discussion of the essential differences between the modern and the ancient geometries, set forth the generalization of figures, stated the invariant property of anharmonic ratios (which was, however, known to Menelaus and Proclus), and made extensive use of the principle of duality. He also wrote the following works: *Die Hauptsätze der Astronomie* (1836; 7th ed., 1890); *Lehrbuch der Statik* (1837); *Die Elemente der Mechanik des Himmels* (1843). His *Gesammelte Werke* have been edited by Baltzer, Klein, and Scheibner (4 vols., Leipzig, 1885–87).

MÖBIUS, KARL AUGUST (1825–1908). A German zoölogist. He was born in Eilenburg; studied at Berlin, and in 1868 was made professor of zoölogy at Kiel. There he became especially interested in marine animals, and was a member of the commission of 1871 and 1872 for the investigation of German seas. Möbius went to Berlin in 1887 as director of the zoölogical museum, retiring in 1905. In 1901 he was president of the fifth International Zoölogical Congress at Berlin. His publications include: *Die Nester der geselligen Wespen* (1856); *Die echten Perlen* (1857); *Neue Seesterne des Hamburger und Kieler Museums* (1859); *Fauna der Kieler Bucht* (1865–72), with H. A. Meyer; *Die Auster und die Austernwirtschaft* (1877); *Die Fische der Ostsee* (1882), with Heincke; *Aesthetische Betrachtung der Saugethiere, Mollusken, Vögel, Insecten* (1900–05).

MÖBIUS, PAUL JULIUS (1853–1907). A German psychiatrist and medical writer. Born at Leipzig, he studied there and in Jena and Marburg, graduating as Ph.D. in 1874, as M.D. in 1876. In 1883 he was admitted as privatdocent to the medical faculty at Leipzig, resigning in 1893. From 1885 he was editor of *Schmidts Jahrbücher der gesamten Medizin.* He was a thorough investigator and a prolific writer, not only in medicine but also in social problems. Among his best-known medical works are: *Allgemeine Diagnostik der Nervenkrankheiten* (2d ed., 1894); *Abriss der Lehre von den Nervenkrankheiten* (1893); *Beiträge zur Lehre von den Geschlechtsunterschieden* (1903–04); J. J. *Rousseaus Krankheitsgeschichte* (1889); *Ueber das Pathologische bei Goethe* (1898); *Ueber Schopenhauer* (1899); *Ueber das Pathologische bei Nietzsche* (1902). His *Ausgewählte Werke* appeared in Leipzig in 1905. Of his writings intended for a wider circle of readers may be mentioned: *Ueber die Behandlung von Nervenkranken und die Errichtung von Nervenheilstätten* (2d ed., 1896); *Ueber den physiologischen Schwachsinn des Weibes* (7th ed., 1905).

MÖBIUS, THEODOR (1821–90). A German philologist, one of the foremost students of old Norse literature and language, son of August Ferdinand Möbius, the mathematician. He was born at Leipzig, studied there and in Berlin, and in 1852 became docent of Scandinavian languages at Leipzig. He was promoted to professor in 1859, and from 1865 to 1888 he was a member of the faculty of Kiel as professor of Norse philology. Möbius' most valuable work was as an editor of Norse sagas. Especial mention should be made of *Fornsögur* (1860), with Vigfússon; *Edda Sæmundar* (1860); *Islendingabók* (1869); *Málsháttakvæthi* (1873); Snorre's *Háttatal* (1879–81); *Kormákssaga* (1886). His other work includes the dissertation, *Die ältere isländische Saga* (1852); the valuable bibliography, *Catalogus Librorum Islandicorum et Norvegicorum Ætatis Mediæ* (1856; a supplemental volume in 1880); *Analecta Norræna* (1859; 2d ed., 1877); *Altnordische Philologie im skandinävischen Norden* (1864); *Altnordisches Glossar* (1866); *Dänische Formenlehre* (1871); *Ueber die altnordische Sprache* (1872).

MOCAYA OIL. See GRUGRU PALM NUT.

MOC'CASIN. See SHOES AND SHOE MANUFACTURE.

MOCCASIN FLOWER. See LADY'S-SLIPPER; also Colored Plate of ORCHIDS, AMERICAN.

MOCCASIN SNAKE, WATER MOCCASIN, or COTTONMOUTH. An aquatic, fish-eating, venomous pit viper (*Ancistrodon piscivorus*) of the southern United States, allied to the copperhead. It may grow to be 4 feet long; is thick and heavy in body; has a tapering tail, without any rattle or spine; and in color is dark chestnut brown, with light marks on the lips, obscure blackish bars on the sides, and the abdomen black blotched with yellowish white. The interior of the mouth, displayed when the snake is about to strike, is cottony white. This serpent exists in large numbers from southern Indiana and southeastern Virginia to the Rio Grande in swamps, marshes, on overflowed lands, and along rivers and bayous, where it is fond of lying in the sunshine upon banks, tussocks, driftwood, or bushes and trees overhanging the water. It never goes far away from such places, and is really a water snake; its food is mainly frogs and fishes. When disturbed it may escape by swimming, but is quite as likely to turn and fight fearlessly. It is one of the most virulent and deadly of all American serpents, but fortunately it does not wander into places where men usually go, except in the irrigated rice fields, where it is greatly dreaded. In captivity it is one of the most untamable and ferocious of known reptiles. It produces eight or ten young annually in midsummer, all fully prepared for offense or defense. The moccasin is "mimicked" by the quite harmless water snake *Natrix*, which, however, is usually much smaller, has a narrower, less triangular and forbidding head, and may always be distinguished by the double row of scales on the underside of the tail. Consult L. H. Stejneger, *Annual Report of the Smithsonian Institution for 1893* (Washington, 1895), and R. L. Ditmars, *The Reptile Book* (Garden City, N. Y., 1914). Cf. COPPERHEAD; RATTLESNAKE.

MOCENIGO, mō'chä-nē'gō. The name of a prominent Venetian family which furnishes several able commanders and doges to the Republic.

The most noted was Tomaso, Doge from 1414 to 1423. At a time when Venice was mistress of extensive possessions, Mocenigo endeavored to maintain her position by a policy of peace. His chief opponent was Francesco Foscari, the next Doge, who urged a policy of conquests on the mainland of Italy. Mocenigo was able to withhold Venice from this course, which afterward proved so disastrous to her power. To him was due the building of the present Doge's palace. At the time of Tomaso's death Venice had reached the zenith of her glory. Consult Alethea Wiel, *Venice* (New York, 1894).

MOCHA, mō'kȧ, or MA'KHA. A strongly fortified seaport, and once the capital, of the Province of Yemen in Arabia. It is situated on the Red Sea, at the head of a little bay near the Strait of Bab el Mandeb, and 130 miles west-northwest of Aden (Map: Turkey in Asia, E 9). It stands in a dry, arid plain and its water is brought by aqueduct from the hills 16 miles distant. The town is ancient, but is now in a ruinous condition. The harbor is shallow and is frequented only by Arab dhows. It formerly exported large amounts of coffee and other produce, which are now distributed through the ports of Aden and Hodeida. Pop., 5000.

MOCHA STONE, or DENDRITIC AGATE. A name given to those cryptocrystalline varieties of quartz, such as agate and chalcedony, which contain mosslike or dendritic forms, usually consisting of manganese dioxide distributed through the mass. They were originally brought into Europe from Mocha. Of a similar nature is the moss agate.

MOCHNACKI, môk-näts'kē, MAURYCY (1803–35). A Polish publicist and critic, born at Bojaniec, Galicia. He took part in the revolution of 1830–31, and, after the capture of Warsaw, left his native country and spent the remainder of his life in France. He was the defender of the Romantic school in Poland, and is said to have dealt the deathblow to classicism in that country. His works are *A History of Polish Literature in the Nineteenth Century* (1830) and a valuable *History of the National Insurrection in Poland in 1830 and 1831* (1834).

MOCKING BIRD (*Mimus polyglottos*). The most famous, if not the sweetest and most beautiful, of American songsters. It receives its popular name from its extraordinary powers of vocal imitation. It is often called mocking thrush, and was formerly considered a peculiarly modified thrush, but now, with its near relatives the catbird and brown thrasher, it is classified very near the wrens. The genus *Mimus* is characterized by the elongate form, long tail, short wings, and straight bill, much shorter than the head, notched near the tip, and whiteness of the plumage on the inferior surface of the body. The mocking bird is about 10 or 11 inches long, the tail being nearly one-half the total length. The upper parts are ashy gray; the wings and tail are nearly black, extensively marked with white; under parts grayish white. The bird is very common in the South Atlantic and Gulf States, and in summer ranges as far north as Massachusetts and westward to the Pacific coast. The nest is built in bushes and low trees. It is made of twigs, leaves, weed stalks, and grasses, lined with rootlets, cotton, etc. The eggs are four to six in number, pale greenish blue, heavily spotted and blotched, especially near the larger end, with bright brown. Two and sometimes three broods are reared in the season, which begins early in the spring and lasts until the end of the summer. During the spring and early summer the birds sing all day and even all night, and in many localities the air rings with their music. Their native song is extraordinarily beautiful, but it has in addition the power of reproducing the songs of other birds with such accuracy as to deceive even the imitated birds. There is, however, very great individual difference in this power, for while some birds seem seldom to attempt any mimicry, others are constantly imitating the sounds which they hear.

When taken from the nest young mocking birds readily become accustomed to cage life and may live for many years. They are easily taught and often improve greatly with careful training. The food of the mocking bird is largely composed of insects and berries or seeds. An inhabitant of gardens and roadsides, fond of human habitations, and seldom seen in the woods, the mocking bird is often found in villages and even in the streets of large towns.

Besides the common mocking bird more than a dozen other species of *Mimus* occur in the West Indies, Mexico, Central and South America. The mountain mocking bird (*Oreoscoptes montanus*) of the western United States is a much smaller and quite different bird and not especially notable as a songster. Its more common name is sage thrasher. See Colored Plate of SONG BIRDS with article THRUSH.

MOCKING WREN. The Carolina wren. See WREN.

MOCK MOONS. See HALO.

MOCK ORANGE. A hardy flowering shrub. See CHERRY LAUREL; PHILADELPHUS.

MOCK SUNS. See HALO.

MOCOA, mō-kō'ȧ. An Indian village in southern Colombia, South America. Brinton includes in the Mocoan linguistic family the Almaguereños, Mocoas, Engaños or Mgaños, Patias, Sebondoyes, etc., found between the first and second degrees, on the affluents of the Río Caquetȧ and near the source of the Putumayo. Consult A. F. Chamberlain in *Journal de la Société des Américanistes de Paris*, N. S., vol. vii (Paris, 1910).

MOCQUEREAU, môk'kē-rō', DOM ANDRÉ (1849–). A French musical scholar, born at La Tessonalle, near Cholet. He received his education at Paris, and while still very young appeared as cellist in Dancla's chamber-music concerts. In 1875 he entered the order of the Benedictines of Solesmes. There he became intensely interested in Gregorian music, to the study and elucidation of which he devoted his whole life. In 1889 he began the publication of his famous and learned *Paléographie Musicale*, a series of photographic reproductions of mediæval manuscripts with monographs regarding the nature and interpretation of the same. In 1904 Pope Pius X issued an order that all reprints of Gregorian music appearing thereafter in the *Editio Vaticana* must conform to the versions given in the *Paléographie*. Besides this monumental work, of which 10 volumes had appeared to 1915, he wrote *L'Art grégorien* (1895), *Notes sur l'influence de l'accent et du cursus tonique latins dans le chant ambrosien* (1897), *Méthode de chant grégorien* (1899).

MODALISM. See MONARCHIANS.

MOD'DER, or KAIBA, RIVER. A left affluent of the Vaal River, South Africa, which it joins after an easterly course of 186 miles, about 31 miles above its junction with the Orange

River (Map: Cape of Good Hope, G 7). During the War of 1899–1902 its banks were the scene of much fighting and witnessed the repulse of the British troops at Maagersfontein in 1899 and the surrender of Cronje at Paardeberg in 1900.

MOD'ELING (from *model*, from OF. *modelle*, Fr. *modèle*, from Lat. **modellus*, from *modulus*, standard, dim. of *modus*, measure). The process of preparing the original pattern or design from which a work in sculpture is to be cast or carved. Modeling is also practiced by medalists, the head or figure intended to be cut in the die being first modeled in relief with wax on a piece of slate. Goldsmiths, silversmiths, and jewelers also model intricate and artistic forms and ornaments of pieces of plate to be cast and chased by them, or in which jewels are to be set. Modeling is also a branch of the potter's trade. For large models the material employed is potter's clay, which, when used by sculptors, is mixed with a portion of sandstone, finely pulverized, to make it work freely. In painting the term "modeling" is used to denote that quality which conveys to the eye the sense of projection, volume, and bulk of an object.

MODEL YACHTING. The pastime of sailing model yachts. In England it is known as miniature yachting, under which name it was first generally practiced in America. The boats used were either exact models to scale of well-known large yachts, or of such perfection as to be capable of being built full size from the models. Departures from conventional design and new types are frequently tried out first in model yachts. Model yachting as an organized pastime is popular in Great Britain and the United States and several clubs have been formed in the larger cities to promote racing between model yachts. Model sailing yachts are usually of sloop or schooner rig and many of the modern ones are of the fin-keel type with outside lead ballast. The hulls of these model yachts are made in various ways, but are usually either shaped up from one piece of soft wood, dug out inside and decked, or are "built up" of layers of soft-wood plank, shaped to the horizontal section or plane before fastening together and then smoothed down to the sectional and profile shape, the labor of the modeling being thus lessened. These models are rigged with great accuracy and, in sailing them, they are usually steered mechanically. They sometimes have a weighted rudder, either with lead on the rudder or on the tiller, so that the former swings as the boat heels and thus counteracts its tendency to come up into the wind. Others have the main sheet attached to the tiller with a wire-spring control which returns the rudder to a fixed position when the pressure from the sheet is relieved, while some have other forms of balance gear or tillers that may be set in any desired position. They thus steer themselves on the various points of sailing. In the United States model yachts are sometimes built up to 5 feet or over in length, but are usually from 30 to 48 inches long. In regattas they are frequently handicapped according to local measurement rules. In experimental work the model department is one of the most important branches of modern shipbuilding plants, owing to the practice of "trying out" important yachts in the shape of models before proceeding with full-size construction. In this manner faults in design are discovered and remedied. Naval vessels are also usually tested out with models in experimental tanks before building. In Great Britain model power yachting is very popular and models of various types of power boats are built from 2 to 4 or 5 feet in length, with miniature power plants (both steam and internal-combustion engines). These are operated on the small lakes and lagoons provided by the municipalities or in experimental tanks.

MODENA, mō'dâ-nâ (Lat. *Mutina*). A former duchy in northern Italy, south of the Po, included in the *compartimento* of Emilia in the modern Kingdom of Italy. The Roman colony of Mutina was founded on the Æmilian Way about 215 B.C., after the conquest of Cisalpine Gaul. Modena was acquired by the house of Este (q.v.) in 1288, and in 1452 the Marquis Borso d'Este was made Duke of Modena by the Emperor Frederick III. He was at the same time made Duke of Ferrara by the Pope, and the political destinies of the two cities were therefore united until 1598, when Ferrara was seized as an escheated fief by its overlord, the Pope, while Modena, with Reggio and Mirandola, remained in the possession of the house of Este. In 1796 the Duke Ercole was dethroned by Bonaparte, and Modena, with Ferrara and Bologna, was erected into the Cispadane Republic, which in 1797 was merged in the Cisalpine Republic. By the Treaty of Lunéville (1801) the Duke of Modena received the Breisgau in exchange for his duchy. On the death of Duke Ercole III in 1803 the duchy devolved by marriage upon the house of Hapsburg, the daughter of Ercole having married Ferdinand, a son of Maria Theresa, and it was awarded by the Congress of Vienna to the son of this marriage, Francis IV, who proved a cruel despot. He married Beatrice, daughter of the King of Sardinia. In 1831 an uprising forced him to take refuge in Austria, but he was promptly restored by Austrian arms, and ruled by the methods which the Hapsburg connections made familiar in all parts of Italy at that time. Francis IV died in 1846 and was succeeded by his son, Francis V. In 1848 he was forced to flee from his state, which proclaimed itself a part of the Sardinian Kingdom, but he was soon reinstated by Austria. He fled when war with Austria broke out in 1859, and although it was provided by the Treaty of Zurich that he should be restored, the people of the duchy declared their wish to be united with Sardinia in the new Kingdom of Italy. Modena then became incorporated into united Italy. See ITALY.

MODENA. A city in northern Italy, formerly the capital of the Duchy of Modena and now the capital of the province of the same name, situated in a rich gardened plain between the Panaro and the Secchia, 24 miles northwest of Bologna (Map: Italy, C 2). A navigable canal connects it with both rivers. It is a city of spacious streets and roomy arcades and is divided into an old and a new part by the historic Via Æmilia. On the main piazza rises the fine Romanesque cathedral, dating from 1099, by Lanfranco. The exterior was restored in 1893 and the interior in 1897. The façade is embellished with curious sculptures. The exterior is also enriched by a rose window and by a colonnade encircling the whole edifice. The interior is at first disappointing, but is in reality imposing. There are here a good altarpiece by Dosso Dossi and a fine group by Mazzoni. The famous Campanile, dating from 1224, is

over 300 feet high. It leans slightly. The Gothic church of San Francesco has an immense and excellent terra-cotta "Descent from the Cross" by Begarelli. The church of San Pietro is remarkable for its fine brick Renaissance façade.

Modena is rich in palaces. The Palace Albergo Arti (1767) now holds the municipal museum, containing several interesting collections. The historic library here—Biblioteca Estense, one of the most famous in Italy—had 140,740 volumes and also over 8000 manuscripts in 1913, some of them very rare. It possesses in addition a coin collection and museum of archæology. Its picture gallery is quite well known, comprising examples by Correggio, Dosso Dossi, Guido Reni, and Velazquez. The splendid ducal palace dating from 1635 is now used for a military school. Modena has statues of Tassoni and Victor Emmanuel II. The trade of Modena is not very important. There are weekly cattle markets—grain, beef, sausages, fruit, wine, and liquors being chiefly dealt in. The manufactures are few. Linen and woolen goods, leather, hats, vinegar, glass, and pottery are produced. Silk is woven, but less extensively than formerly.

In art history Modena is known for its terra cottas. It is the seat of an archbishop and has a university, a theological seminary, a military school for infantry and cavalry, a technical institute, a technical school, an agricultural college, and an academy of fine arts. The university, founded in 1683, has three faculties and a pharmaceutical and a veterinary school. The number of students was 455 in 1913. The public gardens are lovely, and the site of the former ramparts serves as a pleasure ground. Pop. (commune), 1901, 64,843; census of 1911, 70,923. For history, see MODENA (duchy).

MODENA, GUSTAVO (1803–61). A noted Italian actor. He was born in Venice and began the practice of law, first at Bologna, then at Rome. He made his début at the latter place in 1826 and at once sprang into prominence as a tragedian. Among his greatest impersonations were those in the plays of Alfieri, and several from the French, especially the rôle of Louis XI. Political troubles obliged him to live in exile from 1831 to 1837. In the movements of 1847 his patriotism again led him to take a prominent part. He published at this time his *Dialoghetti popolari.*

MOD'ERATOR (Lat. *moderator,* one who regulates, from *moderare,* to regulate; connected with *modestus,* discreet, *modus,* measure, and ultimately with OHG. *mezan, mezzan,* Ger. *messen,* Goth. *mitan,* AS. *metan,* Eng. *mete*). A title of the presiding officer on certain occasions, chiefly academic and ecclesiastical. In the Congregational and Presbyterian churches of the United States the title of moderator is given to the presiding officer of assemblies. In the former the title is used not only in the meetings of congregations and district, State, and triennial conventions, but also in councils called to act in a judicial capacity. The presiding officers in the series of Church courts provided for in the Presbyterian system, viz., the session, the presbytery, the synod, and the General Assembly, are usually called moderators. The pastor of a local church is, ex officio, moderator of the session of the church, while in the other bodies mentioned the moderators are elected from among the presbyters. The most important function of these officers, apart from presiding at the sessions of the body, is the naming of the standing committees. The term is also applied to the superintendent of the examinations for degrees and honors at the universities of Cambridge and Oxford. In the United States the presiding officer of a town meeting is also called moderator.

MODERN GREEK. See GREEK LANGUAGE (at the end). For the literature of modern Greek, see ROMAIC LITERATURE.

MODERN INSTANCE, A. A novel by W. D. Howells (1881). Though painful in its general features, it is a graphic picture of certain phases of New England life.

MOD'ERNISM. A term applied to opinions advanced by Catholic writers—chiefly ecclesiastics—both in Europe and America, which ran counter to traditional orthodoxy. It was an attempt to adjust religious views to the spirit of modern progress. It finally drew from Pius X an Encyclical which reprobated the doctrine as modernism and its teachers as modernists. The system is considered an outcome of the French Revolution, liberalism, and modern critical scholarship. Its advocates, in many instances men of ability and education, are not always clear in their formulas. Their tendency appears to be a denial of the objective value of the Catholic creed and a confining of its dogmas to a mere symbolism begotten of the most intimate aspirations of individual human nature. Albert Houtin, at one time a partisan, in his *History of Catholic Modernism* (Paris, 1913) says modernism may be defined as "the desire of adapting religion to the social, moral, and intellectual needs of the times; and if the word employed to designate it is not very ancient, it at least represents the eternal conflict between the spirit of progress and the spirit of inertia, between those who make of religion a formula and those for whom it is life itself." They summoned to their aid principles advocated by Kantism, pragmatism, evolution, and higher criticism. The spread of the propaganda was rapid and wide. There were champions of the new doctrine in the Old World and the New. The antichristian and anticlerical press entered the lists. Names of note subscribed to it—names such as Father George Tyrrell (q.v.), whom Houtin calls the leader, Baron Frederic von Hügel, Alfred Loisy (q.v.), and others. From 1888 until 1907 there was no general censure. Some writings had been condemned and letters of remonstrance from some cardinals and bishops were issued. In July, 1907, a decree approved by the Pope appeared; its opening words were "Lamentabili sane exitu." It contained and condemned as heretical, false, rash, bold, and offensive 65 propositions, 38 of which related to biblical criticism and the remainder to modernism. Cardinal Vanutelli on Aug. 28, 1907, wrote to bishops and superiors of religious orders demanding an immediate and rigorous suspension of professors in all educational institutions who did not conform to the decree. He moreover proscribed the reading of all publications favoring modernism. On September 6 of the same year was communicated to the whole world the encyclical of Pius X beginning with the words "Pascendi Dominici Gregis," which words are now its historical title. Modernism, it says, is a synthesis of all heresies and has affected the layman, the theologian, the historian, the critic, the apologist, and the reformer. The causes of

this novelty are put down as curiosity, pride, and ignorance of scholastic philosophy. It has broached errors concerning the inspiration, truth, and study of Holy Writ; concerning the teaching of the Church, Christology, the sacraments, the institution and organization of the Church, and doctrinal evolution. The encyclical seeks the necessary remedies and imposes a series of energetic measures and closes with a stirring appeal to the rulers of the Church. It proposes the study of scholastic philosophy, the removal of all educators imbued with modernism, the prohibition of all publications of a like nature, and the convening by bishops every two months of a Council of Vigilance whose duty it shall be to abolish everything that savors of novelty in religious matters. Naturally those indicted in the encyclical were vehement in their protestations. The general attitude seems to have been one of peaceful surrender. But Pius X had not as yet struck the final blow. It came in the shape of a decree the initial words of which are "Sacrorum antistitum." It is dated Sept. 1, 1910. It impeaches modernist obstinacy and specious cunning. It adds to the practical measures laid down in the "Pascendi." It insists upon all members of the priesthood of all ranks and upon candidates for holy orders and upon all professors in all houses of ecclesiastical training taking a solemn oath respecting modernist views and adhering to all the authoritative teaching of the Church. It is simply a profession of faith, giving assent to all articles of Catholic belief and dissenting from all the tenets in all times condemned by the Church of Rome. All who take it swear that they admit the existence of God and the demonstrability of the same by the light of natural reason; that they accept the exterior proofs of revelation, i.e., miracles and prophecies, as indubitable signs of the divine origin of religion; that they acknowledge the Church as guardian and mistress of the revealed word which was declared by Christ during his life on earth and declared really and historically; that they reject the heretical supposition of the evolution of dogma; that they deny the substituting for the deposit of divine faith confided to the Church a philosophic fiction or an evolution of human conscience susceptible of indefinite progress; that they adhere to everything contained in the encyclical "Pascendi" and the decree "Lamentabili," all relating to the history of dogma; that they do not consent to the statement that anything proposed by the Church can contradict history or be incompatible with the most authentic origin of Christianity; that they refuse to affirm that there is nothing divine in sacred tradition or if it be divine it is so in a pantheistic sense only; that they will support unto the end that the certain criterion of truth is, has been, and will be till the end in the episcopacy transmitted through apostolic succession, not, however, in such manner as to hold that which is most in keeping with the culture of an epoch, but in the sense that the absolute truth preached in the beginning must never be believed in any other meaning.

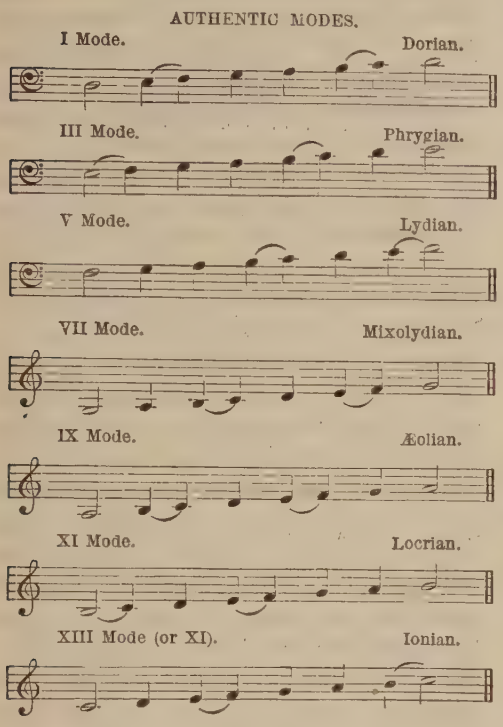
This synopsis discloses more clearly perhaps than anything else can some of the most striking declarations made by the modernists. Practically the entire Catholic priesthood subscribed to these promises. Those who refused have been dealt with severely and are outside the pale of the Church either as suspended or excommunicated. At the present moment there are apparent no symptoms of modernism within the Roman Catholic church.

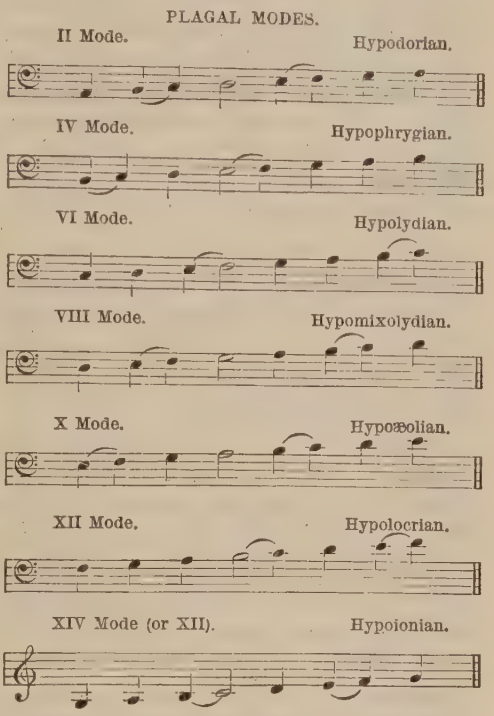
Bibliography. The best reading on the subject of modernism will be found in the *Acts* of the Roman see and notably among the documents alluded to in this article; the works of Father George Tyrrell, especially *Mediævalism* (London, 1909); also his *Autobiography and Life* (2 vols., ib., 1912); Charles Gore, *The New Theology and the Old Religion* (New York, 1908); Cardinal Mercier, *Le modernisme* (Brussels, 1908; Eng. trans., St. Louis, 1910); Joseph Rickaby, *The Modernist* (London, 1908); A. L. Lilley, *Modernism: A Record and Review* (New York, 1908); Paul Sabatier, *Modernism*, translated by C. A. Miles, Jowett lectures (ib., 1908); Newman Smyth, *Passing Protestantism and Coming Catholicism* (ib., 1908); A. F. Loisy, *The Gospel and the Church* (ib., 1909); Vermeersch, *Tractatus de Modernismo* (Bruges, 1910); J. M. Bampton, *Modernism and Modern Thought* (London, 1913); Albert Houtain, *L'Histoire du modernisme catholique* (Paris, 1913).

MODERN MACCABEES, Knights of the. A fraternal beneficial organization founded in 1881 for social and benevolent purposes. The organization had at the close of the year 1914 one great camp and 1290 subordinate tents or branches, with a total membership of 61,863. During the year 1914 the organization disbursed $1,240,690, and the entire amount of benefits paid since the date of organization was $21,590,889. This is the original order bearing this title.

MODES (OF., Fr. *mode*, from Lat. *modus*, measure, manner). The octave species in use before the time of the invention of harmony as well as during the period of the contrapuntal style up to the time of Bach. The original scale of the ancient Greeks was a *descending* minor scale with semisteps between the third and fourth and seventh and eighth degrees. Other tones than the fundamental were also taken as starting points, but the tones of the original scale remained unaltered. This shifted the position of the semisteps every time the starting tone was shifted. The combinations of tones thus obtained were regarded as separate scales and called octave species. This system the theorists of the early Middle Ages adopted, but instead of using *descending* scales they made use of *ascending* ones. At the same time they retained the original Greek names, but applied them to scales not corresponding to the original Greek scales. From among the nine octave species of the Greeks four were originally selected for the service of the Church. These were known as the *authentic modes*. Their establishment is commonly attributed to St. Ambrose, Bishop of Milan, who died in 397 A.D. Some time later—and tradition mentions St. Gregory I (Pope from 590 to 604) as their originator—four other modes were added. These were called the *plagal modes*. During the sixteenth century, when the principles of harmony began to be first understood, two more authentic with their corresponding plagal modes were added, so that the total number of Church modes was 12. Some theorists claimed the existence of two more, Locrian and Hypolocrian (one authentic and one plagal); but neither of these was ever used in actual practice. The

reason for their rejection will become apparent a little farther on. The following is a complete table of the fourteen modes:





(In this table the final note, corresponding to our modern tonic, of each mode is indicated by a half note, the semisteps by slurs.) It will be seen that the compass of every *authentic* mode is from the final to its octave above; that of every *plagal* mode from a fourth below to a fifth above the final. Every *authentic* mode has its corresponding *plagal* distinguished by the prefix hypo (under), and beginning a fourth below the authentic mode. Furthermore, every mode must be considered as consisting of two series of tones forming either a pentachord or a tetrachord in such a manner that the highest tone of the lower series is at the same time the lowest tone of the higher series. In the authentic modes the first five tones constitute the pentachord, the last four the tetrachord. In the plagal modes the tetrachord comes before the pentachord. The former arrangement is called by the eminent theorist Zarlino (q.v.) *harmonic division* (*divisione armonica*); the latter arrangement, *arithmetical division* (*divisione aritmetica*). In examining the above table it will be noticed that the pentachords and tetrachords of all the modes, except the Locrian and Hypolocrian, exhibit the compass of a *perfect* fifth or fourth. In these two modes the pentachord represents the compass of a *diminished* fifth, the tetrachord that of an *augmented* fourth (tritonus). Both these intervals were strongly condemned by musical theory, and hence these two modes were rejected as impure, and therefore impracticable.

In every mode four notes have a special significance, just as the tonic, dominant, and subdominant have in our modern scales. These notes are: (1) the final; (2) the dominant; (3) the mediant; (4) the participant. The *final* is the tone on which every melody ends. By means of this tone the mode in which any melody is written is determined. If it moves within the range of the final and its octave, the mode is authentic; if it moves below or above the final, the mode is plagal. The *dominant* of every authentic mode is found a fifth above the final; of every plagal mode a third below the dominant of its corresponding authentic mode. The only tone which can never serve as a dominant is B. Whenever B would occur C is substituted for it. The reason for this change is that B always forms a dissonant interval with F, either an augmented fourth or a diminished fifth. The *mediant* derives its name from the fact that in the authentic modes it always lies midway between the final and the dominant; it is always the third tone of the mode. In the plagal modes the position of the mediant is rather unsettled, owing to the necessity of obtaining a convenient tone for cadences, as in the case of the dominant, and for the same reason B can never appear as a mediant. C is invariably substituted. The *participant* in the authentic modes lies either between the final and the mediant, or between the mediant and the dominant. If, however, two notes lie between the mediant and the dominant, either tone may serve as the participant. In the plagal modes the participant is always the same as the dominant of the corresponding authentic mode. Since each plagal mode begins a fourth below its corresponding authentic, this dominant (participant of the plagal) is the same as the lowest tone of the plagal mode. Here, again, B is barred and C substituted. Likewise F can never be participant, the next higher tone (G) being substituted.

While every melody must end upon the final,

it may begin upon any one of the four just-mentioned tones. But any phrase except the last of a melody may also end upon these tones. Hence they are also called *cadences* or *modulations*. As in a long melody a feeling of monotony would be produced by the constant employment of these modulations, two or more tones are admitted. The final, dominant, mediant, and participant are called *regular* modulations and the additional tones *conceded* modulations. One of the most frequent of these conceded modulations is the seventh tone of the mode. This always appears an octave lower than the true pitch, on account of a license permitting the extension of every authentic mode by one tone below its final and of every plagal mode by a sixth above the final. In order to bring melodies within the range of certain voices it sometimes happens that they are written a fourth higher or a fifth lower than the regular mode. Such transposition is always indicated by a B flat in the signature. In these cases the true final will be either a fourth below or a fifth above the closing note.

According to their range melodies are classed as *perfect*, *imperfect*, and *superfluous*. A perfect melody moves within the range of the mode in which it is written; an imperfect melody does not exhaust the entire range; a superfluous melody exceeds the range either above or below. Some melodies exhaust the complete range of both the authentic and its corresponding plagal mode; these are said to be written in a *mixed mode*. See GREEK MUSIC; PLAIN CHANT; and for an explanation of the two modes in use at present, see MAJOR; MINOR.

MODES'TO. A city and the county seat of Stanislaus Co., Cal., 77 miles south by east of Sacramento, on the Tuolumne River and on the Southern Pacific Railroad (Map: California, D 5). It has some manufactures and a trade in grain, fruit, wool, live stock, alfalfa meal, hay, and dairy products, being located in a productive region, the fertility of which is developed by an elaborate system of irrigation. The courthouse, public library, and county hospital are fine structures. Modesto adopted the commission form of government in 1912. The city owns its water works. Pop., 1900, 2024; 1910, 4034.

MODICA, mō'dē-kȧ. A city in the Province of Syracuse, Sicily, 33 miles southwest of the city of Syracuse, in the fertile and beautiful valley of the river Mauro. It is 1445 feet above the sea (Map: Italy, E 6). There are a public library, a hospital, an infant asylum, a Gymnasium, technical schools, a technical institute, and a theatre. The chief products are cattle, wine, grain, oil, and tropical fruits. Pop. (commune), 1901, 48,962; 1911, 55,924.

MODIFICATION OF TEMPO. See TEMPO.

MODIL'LION (OF. *modillion, modiglion*, Fr. *modillion*, from It. *modiglione*, modillion, from Lat. *modulus*, model). An ornamental bracket much used in classic architecture, especially in the cornices of the Corinthian and Composite styles. It is so called only when used in a long series—not singly—and is usually small. Larger and single brackets are called *consoles*.

MODIOLOIDES, mō'dī-ō-loi'dēz (Neo-Lat. nom. pl., from Lat. *modiolus*, nave of a wheel + Gk. *εἶδος, eidos*, form). One of the very earliest fossil clams known, found in rocks of Lower Cambrian age. See FORDILLA; PELECYPODA.

MODIOMORPHA, mō'dī-ō-môr'fȧ (barrel-shaped; from *modio*, an abbreviation of Lat. *modiolus*, the nave or hub of a wheel, and Gk. *μορφή, morphē*, form, shape). A group of pelecypods similar in aspect to the recent *Mytilus*, of which they are the Paleozoic prototype. The fossil Modiomorpha are extremely abundant in the Devonian rocks, especially of North America. See PELECYPODA.

MODJESKA, mō-jĕs'kȧ, HELENA (1844–1909). A noted actress, of Polish origin, who after 1876 resided in the United States. She was the daughter of Michael Opido, a musician, and was born in Cracow, Oct. 12, 1844. Married in 1860 to a manager named Modrzejewski, from the contraction of whose name comes that by which she is known, she became in 1865 the leading actress in the theatre of her native city. Her husband died in 1865 and three years later she was married to Count Bozenta Chlapowski and became the star of the Imperial Theatre of Warsaw. Political difficulties and ill health led her in 1876 to go with her husband and others, including Henryk Sienkiewicz, to California, where they established a Polish colony. This did not succeed, and after only a few months' study of English the Polish Countess made her début in San Francisco (July, 1877) as Adrienne Lecouvreur. She won a surprising success, and was soon seen in New York in the same play. In 1880 she made her London début in the part of Camille. In 1889 and 1890 she starred with Edwin Booth, with whom she had already in 1883 appeared in *Romeo and Juliet*. Her most notable impersonations were of Shakespearean characters, among them Ophelia, Rosalind, Viola, Imogen, Cleopatra, and Lady Macbeth; but she was also famous as Mary Stuart, and appeared with success in modern plays. Her great natural gifts gained her as a tragic actress a foremost rank upon the American stage, despite the fact that she never used English with ease. In May, 1905, she was given a farewell benefit in New York City at the Metropolitan Opera House. She then settled in Orange County, in southern California, and died April 8, 1909. She was buried at Cracow, Poland. Consult: R. W. Gilder, in Matthews and Hutton, *Actors and Actresses of Great Britain and the United States* (New York, 1886); McKay and Wingate, *Famous American Actors of To-Day* (ib., 1896); L. C. Strang, *Famous Actresses of the Day in America* (Boston, 1899); William Winter, *The Wallet of Time*, vol. i (New York, 1913); and above all, *Memories and Impressions of Helena Modjeska: An Autobiography* (ib., 1910).

MÖDLING, mĕd'lĭng. A town and favorite summer resort of Lower Austria, situated at the foot of the Wienerwald, 10 miles south-southwest of Vienna (Map: Austria-Hungary, E 2). It has a fifteenth-century church, a military academy, a girls' school, and an agricultural school with courses in brewing and horticulture. The manufactures consist of iron products, railway supplies, boilers, sash and blind work, cartons, lacquer, and shoes. Pop., 1900, 15,304; 1910, 18,067.

MO'DOC. A small but warlike and aggressive tribe, formerly ranging about Lower Klamath Lake and Lost River, and on the extreme northeast frontier of California. The name is said to mean 'aliens' (i.e., enemies), having been given by some one of the neighboring tribes. They call themselves *Maklaks*, 'people,' and with their northern neighbors, the Klamath,

whose language they speak and with whom they originally formed one tribe, are classified as a distinct linguistic stock known as Lutuamian. At some earlier period they seceded from the parent Klamath tribe and established themselves on Lost River. Their houses were round log structures, covered with earth, and their women were expert basket weavers and cradle makers. The Modoc made no alliances, but were at war with all the weaker surrounding tribes, and carried on a regular slave trade by selling their captives to the Columbia tribes in exchange for ponies. They came into early collision with the California immigrants, and a chronic warfare was inaugurated, marked by wholesale massacres on both sides. In 1850 they were severely defeated by troops under Captain Lyon. In 1852 they massacred a number of settlers, for which terrible retaliation was made by a band of miners under the notorious Ben Wright, who invited their warriors to a feast and peace conference and treacherously murdered 41 of the 46 who responded. Although thus diminished by nearly half their fighting force, the Modoc recommenced the war of extermination, which continued until 1864, when they entered into a treaty by which they agreed to go upon the Klamath reservation in Oregon. By this time they had been reduced to about 250. Finding their position there intolerable by reason of the persecution and insults of the Klamath, who considered them as rebels, the majority under a younger leader known as Captain Jack (q.v.) left the reservation and returned to their old home on Lost River. They were induced to return on promise of protection, but finding themselves again subjected to the same persecution without official redress, they returned to Lost River, leaving only about 100 behind under the old hereditary chief Skonchin. Orders were given to the troops to bring them back, and on Nov. 29, 1872, the final Modoc war was begun by a night attack on Captain Jack's camp. The Modoc retreated to the Lava Beds, just across the line, where they so intrenched themselves in the labyrinth of volcanic rocks that 400 regular troops were twice forced to retire with heavy loss without being able to come near enough even to see one of their concealed enemies. A peace commission to confer with the hostiles was then appointed, consisting of General Canby, Rev. Dr. Thomas, and Indian Superintendent Meacham. They met the head men of the Modoc on April 11, 1873. Jack repeated his demand to remain on Lost River and, on Canby's refusal, drew his revolver and shot him dead. At the same moment the other warriors fired, killing Thomas instantly and severely wounding Meacham, but were driven off before they could finish the work by the arrival of the troops whom Canby had kept hidden within easy reach. The war was continued under General Davis until the hostiles were finally starved out and compelled to surrender two months later. A part of the surrendered hostiles were returned to their kindred on the Klamath reservation, Oregon, while the rest were transported to the Quapaw reservation in Oklahoma. Those on the Klamath reservation now number 212, and are apparently fairly prosperous and advancing and coalescing with the Klamath. Those on the Quapaw reservation number 33, having decreased about one-half since the removal. See KLAMATH.

MO'DRED. The nephew of King Arthur. Tennyson represents him ambitious to gain the throne, and after revealing Guinevere's unfaithfulness to the King, he stirs up a revolt, during which Arthur is slain.

MODUGNO, mô-dōō'nyô. A town in the Province of Bari delle Puglie, Italy, 5 miles southwest of Bari. It has a twelfth-century Renaissance church and markets fruit. Pop. (commune), 1901, 11,885; 1911, 11,784.

MODULA'TION, IN MUSIC (Lat. *modulatio*, from *modulari*, to regulate, from *modulus*, dim. of *modus*, measure, manner). The process of changing from one key to another within the same composition. In a movement of even the smallest dimensions monotony would result if the composer should confine himself strictly to one key. There are two kinds of modulations—*passing* and *final*. Passing modulation introduces chords belonging to other keys only incidentally and soon returns to the original key. But when a piece modulates so that the original key is abandoned and a new key takes its place the modulation is final. In the sonata form (see SONATA) the first development of the principal subject confines itself only to *passing* modulations. A *final* modulation occurs at the entrance of the secondary subject (generally to the dominant key). The second or development section is concerned entirely with *passing* modulation. But even here the choice of keys is not arbitrary. However, no rules can be given; the artistic and æsthetic instinct of the composer is the sole guide. According to the theory of the present day, all modulation is regarded in its relation to the principal key of the piece, and, in a wider sense, all keys are but steps within the unlimited domain of tonality (q.v.). Older composers are very sparing and careful in the use of modulation, but those of the nineteenth century (especially Wagner, Schumann, Chopin) practically removed all barriers. The means of modulation are various and cannot be discussed in an article like the present. The most frequent expedient is the different interpretations put upon the same chord. Thus the chord c, e, g may be conceived as tonic of C, dominant of F, subdominant of G, etc., and consequently can be used to modulate at once to those keys. In modern music the chord of the diminished seventh plays an important part in modulation. Thus c♯, e, g, b♭ leads into D minor; the same chord conceived as e, g, b♭, d♭ into F minor; as g, b♭, d♭, f♭ to A flat minor; as a♯, c♯, e, g into B minor, etc. Consult: F. Dräseke, *Anweisung zum kunstgerechten Modulieren* (Freienwalde, 1876); H. Riemann, *Systematische Modulationslehre* (Leipzig, 1887); id., *Harmonie und Modulationslehre* (ib., 1900); S. Jadassohn, *Die Kunst zu modulieren* (ib., 1890). See HARMONY.

MOD'ULE (Fr. *module*, from Lat. *modulus*, small measure). In architecture, a conventional unit of measurement for determining the proportions of the various parts of a building, especially of the classic orders. Vitruvius (iv, 3) divides a hexastyle Doric front, e.g., into 44 modules; a tetrastyle into 28; the lower diameter of the column then measures two modules, the height of the column 14 modules, and so on. This scheme was undoubtedly derived from late Greek writers. The writers of the middle and late Renaissance, first in Italy and later in France, delighted in designing individual versions of the classic Roman orders

and in formulating for each of these a minutely detailed canon of proportions based upon modules divided into "parts." Thus, Vignola (q.v.), taking the lower semidiameter of the shaft as his module, divided this into 12 parts for the Tuscan and Doric orders and 18 for the other orders. Palladio and some French writers divided the semidiameter module into 30 parts for all the orders. The module of Perrault was one-third the diameter. Jomard adopted as a module for Egyptian architecture one-tenth the height of the column. Prof. W. R. Ware simplified Vignola's scheme by taking the diameter as the module divided into six parts. See ORDERS OF ARCHITECTURE.

MOD'ULUS (Lat., small measure). A term variously used in mathematics. In the theory of logarithms (q.v.) it designates the multiplier by which one system of logarithms is transformed into another. The expression $\sqrt{a^2 + b^2}$ is often called the modulus of the complex number $a + bi$, where i stands for $\sqrt{-1}$. (See COMPLEX NUMBER.) In the theory of numbers the term congruence (q.v.) is applied to an equality in which we neglect certain quantities which are called moduli; e.g., $26 \equiv 12 \pmod 7$ denotes that 26 is congruent to 12 to the modulus 7, i.e., that $26 - 12$ is a multiple of 7, or that the remainder found in dividing 26 by 7 (i.e., 26 with the multiples of 7 neglected) is equal to the remainder found in dividing 12 by 7, this remainder being 5 in both cases. See CONGRUENCE.

MODULUS OF ELASTICITY. See ELASTICITY.

MOE, mō, JÖRGEN (ENGEBRETSEN) (1813–82). A Norwegian poet, folklorist, and bishop. He was born at Hole in Ringerike, and before his entry at the University of Christiania became well acquainted with Asbjörnsen (q.v.), later his collaborator. From 1835 to 1852 hardly a year passed during which Moe did not make a long tour of the country in search of popular legends. The first collection of these tales, edited by Moe and Asbjörnsen under the title *Norske Folkeeventyr*, appeared in 1842–44, was republished by Moe in 1852, and was translated into English by Dasent (1859). His *Samlede Skrifter* (2 vols., 1877) include popular poems (1849) and the juvenile stories, *I Brönden og i Kjærnet* (1851). Moe died at Christiansand, where he had been Bishop for seven years. Consult J. B. Halvorsen, *Norsk Forfatter-Lexikon*, vol. iv (Christiania, 1896), and Henrik Jæger, *Illustreret norsk Literaturhistorie*, vol. iii (ib., 1896).

MOE, LOUIS MARIA NIELS PEDER HALLING (1859–). A Danish illustrator and etcher, born near Arendal, Norway. He studied at the Academy of Copenhagen and under Tuxen. He is best known for his illustrations of Saxo's *Krönike* (Winkel-Horn's translation), of Sagas, and of many books for children. To a number of his illustrations he himself wrote the text, such as *Langt, langt bort i Skoge* (1904). After 1900 he interested himself also in etching, and published collections of fantastic pictures from fairy tales and from animal life, among them *Dyrefabler* (1909).

MOE, (INGEBRET) MOLTKE (1859–1913). A Norwegian folklorist, born at Krödsherred in Ringerike, son of Jörgen Moe. He studied theology and the history of religion at the University of Christiania and then took up the study of comparative folklore. After 1876, when he became collaborator with P. Chr. Asbjörnsen, he went through the country on a government stipend, collecting traditions. In 1886 he was appointed professor of the Norwegian native language and of popular traditions, later also of Old Norse, at the University of Christiania. A learned and remarkably cultured man, Moe performed a real service in the field of folklore. He contributed to numerous periodicals and was a collaborator in many important literary enterprises. As an educational expert he was much consulted by the government. He revised several editions of Asbjörnsen's and Moe's *Folkeeventyr* and of Asbjörnsen's *Huldreeventyr*. Among his own publications are: *Norske Fornkvæde og Folkevisur* (1877); *Ten Norske Folkeviser* (1899); *Retskrivning og Folkedannelse* (1900), a valuable work. Consult J. B. Halvorsen, *Norsk Forfatter-Lexikon* (Christiania, 1885–1908).

MOEL, moil (Welsh, hill). A hill having a rounded outline in its upper portion because the summit is protected from rapid denudation by a layer of soil and a growth of forest trees or grass or by marshes of peat. Consult Marr, *The Geographical Journal* (London, 1901).

MOELLER, mēl'lēr, HENRY (1849–). An American Roman Catholic archbishop, born at Cincinnati, Ohio, where he studied at St. Xavier's College in 1863–69. He was then a student in Rome, where he received the degree of D.D. from the Propaganda in 1876. He held a pastorate at Bellefontaine, Ohio, in 1876–77; was professor at Mount St. Mary's Seminary in 1877–79; and served as secretary to Bishop Chatard, of Indianapolis, in 1879–80. From 1880 to 1900 he was secretary and chancellor of the archdiocese of Cincinnati; then served as Bishop of Columbus in 1900–03; and was promoted to Coadjutor Archbishop of Cincinnati, where he became Archbishop in 1904 and was invested with the pallium in 1905.

MÖEN, mē'en. A Danish island in the Baltic Sea, separated from Seeland on the northwest by the Ulv Sound and from Falster on the southwest by the Grön Sound (Map: Denmark, F 3). Area, 82 square miles. Pop., 1901, 14,504; 1911, 14,127. Its surface is remarkably irregular compared with the rest of Denmark. The limestone formation which underlies a large part of the country here crops out in the form of high and steep chalk cliffs of great natural beauty. The soil is very fertile. Agriculture and fisheries are the leading industries. The chief town and seaport is Stege, on the west coast, with a population in 1911 of 2250.

MŒ'RÆ. The Greek name of the Fates. See PARCÆ.

MŒRIS, mē'rĭs (Lat., from Gk. Μοῖρις, *Moiris*), LAKE. The ancient name of a sheet of water in central Egypt, a remnant of which, it is generally agreed, exists in the present Birket Karun or Birket el Kerun (lake of horns), 34 miles long by 4½ miles wide, extending along the northwestern borders of the Province of Fayum (Map: Egypt, C 2). Classical writers have left confused descriptions of a great artificial reservoir at this locality for storing the water of the Nile and irrigating the surrounding country by means of sluices. As the lake is at present 130 feet below the level of the sea, it must, within historic times, have hollowed out its bed 200 feet, or the artificial lake must have been a small reservoir southeast of it, or else the an-

cients must have totally misrepresented the whole matter. The investigations of Major Brown, which have been fully confirmed by Petrie, seem to point to the last-named solution. The lake formed by the Bahr Yusuf (Joseph's Canal) must have been much larger, until the kings of the twelfth dynasty, and later the second Ptolemy, diked off considerable portions. The semimythical King Mœris of Herodotus is Amenemhat III, the builder of the Labyrinth (q.v.), whose two colossi have been discovered at Biahmu. Consult W. M. Flinders Petrie, *Hawara, Biahmu, and Arsinoë* (London, 1889).

MŒRITHE'RIUM. A very generalized fossil mammalian type, the most primitive known ancestor of the Proboscidea. It was about the size of a tapir and is found in Upper Eocene deposits of the Fayum, Egypt. It was a subaquatic animal, and its chief resemblance to the elephants was the enlargement of the same front pair of teeth as those constituting the tusks of the modern elephants; the structure of the grinding teeth showed them to be essentially ancestral to those of Palæomastodon (q.v.). Other parts of the animal exhibit analogies to the primitive sea cows or sirenians.

MOERO, mwā'rō, Moero-Mkata, or Mweru. A lake in south Central Africa, situated 100 miles west of the south end of Lake Tanganyika. (Map: Congo, Belgian, E 4). It lies on a plateau at an altitude of 3000 feet and is surrounded, especially on the north, by wooded mountains having an alpine aspect. It is 68 miles long, 24 miles wide, and its bottom slopes gradually downward towards the north, where depths of 40 feet are registered. An extensive swamp, 30 miles long, at the south end marks the former extent of the lake. It is evidently of great age, as it contains a remarkable species of fish belonging to the Silurian period and of amphibious habits. The Luapula River enters the lake at the southern end and leaves at the northern end to join the Congo. The lake was discovered in 1867 by Livingstone. The settlement of Rhodesia was founded on its eastern shore in 1892.

MŒSIA, mē'shī-ȧ (Lat., from Gk. Μοισία, *Moisia*). An ancient Roman province, bounded by the Danube, and for a short distance by the Savus (Save) on the north, the Black Sea on the east, the mountain chains of Hæmus (Balkan) and Orbelus on the south, and the range of Scardus and the river Drinus on the west (Map: Rome, E 2). The river Cibrus (Tzibritza) divided it into two parts, of which the eastern (Mœsia Inferior) corresponded approximately to the present Bulgaria and the western (Mœsia Superior) to Servia. Its original inhabitants were mostly of Thracian race. Gaulish or Celtic invaders settled in western Mœsia about 277 B.C., under the name of Scordisci. The Romans first came in contact with the tribes of Mœsia after the conquest of Macedonia. In 75 B.C. C. Scribonius Curio, proconsul of Macedonia, forced his way as far north as the Danube and gained a victory over the Mœsians, but the country was not completely subjugated till 29 B.C. It was made a Roman province in the reign of Augustus and flourished for more than two centuries; but as a frontier province it was much exposed to hostile invasions and required a line of fortresses and stations all along the south bank of the Danube and a wall from Axiopolis to Tomi. The chief Roman towns were Viminacium in Mœsia Superior, and Istros, Marcianopolis, Nicopolis, and Tomi (to which Ovid was banished) in Mœsia Inferior. In 250 A.D. the Goths (q.v.) made an irruption into the country and defeated and slew the Roman Emperor Decius in the following year, and about the end of the fourth century it was given up to them by the Emperor Theodosius I. (See Mœso-Goths.) Slavic tribes settled in Mœsia in the sixth and seventh centuries, and towards the close of the seventh century the Bulgarians established their kingdom in the eastern part. Consult S. E. Stout, *The Governors of Mœsia* (Princeton, 1911).

MŒSO-GOTHS, mē'sō-gŏths'. A name given to the Goths who, early in the third century, settled in Lower Mœsia, at the mouth of the Danube. (See Mœsia.) In the fourth century they were converted to Christianity through the efforts of Ulfilas, who translated the Bible into their dialect. (See Ulfilas.) The name Mœso-Goths is applied especially to those Goths who remained in Mœsia after the great migrations early in the fifth century. See Goths.

MOF'FAT, David Halliday (1839–1911). An American banker and railroad builder, born at Washingtonville, Orange Co., N. Y. He became a bank messenger in New York City in 1854, a bank clerk at Des Moines, Iowa, in 1855, and then clerk and cashier in a bank at Omaha. In 1860 he went by prairie schooner to Denver. During the Civil War he made several large shipments of gold bullion to the East. In 1866 he became cashier, and shortly afterward president, of the First National Bank of Denver, in which capacity he served until his death. He was president of the Denver and Rio Grande Railroad in 1884–91, built the Florence and Cripple Creek Railroad largely at his own expense, and was interested in more than 100 mines in Colorado.

MOFFAT, Robert (1795–1883). A Scottish Congregational missionary to South Africa, born in Ormiston, Scotland. In early life he was a gardener, but having made the acquaintance of some Wesleyan ministers, he determined to engage in religious work and sought to qualify himself to be a missionary. He was accepted by the London Missionary Society and set apart for the ministry in 1816, was appointed to South Africa, and arrived at Cape Town early in 1817. He proceeded to Namaqualand and to the kraal of Africaner, a savage chief, who was converted and became an earnest Christian. The country, however, did not prove well adapted for the location of a mission centre, and Moffat, after having explored a considerable region, established the station of Kuruman in 1825. His missionary labors were very successful and productive of great benefits in the amelioration of the character of the people and the development of civilization. In 1859 a new centre was established among the Matabele at Inajati. The missionary labors of Dr. Moffat and his travels and adventures are described in his book, *Missionary Labors and Scenes in South Africa* (1842). During 1839–43 he visited England and then returned to Africa and remained there till 1870, when he went back to England and settled in Brixton, London, where he spent the rest of his life. In 1873 he was presented with the sum of £5800 in recognition of his great services. His wife (Mary Smith), whom he married in 1819, shared in all his missionary labors, and his daughter Mary became the wife of David Livingstone (q.v.). Besides the volume already men-

tioned, Dr. Moffat published *Africa, or Gospel Light Shining in the Midst of Heathen Darkness: A Sermon on Faith* (1841) and *Rivers of Water in Dry Places: An Account of the Introduction of Christianity into South Africa, and of Mr. Moffat's Missionary Labors* (1863). He also translated the Bible into the language of the Bechuanas. The full account of Moffat's life and labors is given in the *Lives of Robert and Mary Moffat*, by their son, John Smith Moffat (London, 1885; popular ed., 1889).

MOFFATT, James (1870–). A British biblical scholar. He was born in Glasgow and was educated there in the academy, university, and Free Church College. He was ordained to the ministry of the Free church in 1896, was Jowett lecturer in London in 1907, and left his church at Broughty Ferry in 1911 to become Yates professor of Greek and New Testament exegesis at Mansfield College, Oxford. He translated (1904–05) Harnack's *Expansion of Christianity*, edited "Thessalonians" (1908) and "Revelation" in the *Expositor's Greek Testament*, and wrote: *The Historical New Testament* (2d ed., 1901); *George Meredith, a Primer to the Novels* (1909); *Paul and Paulinism* (1910); a valuable *Introduction to the Literature of the New Testament* (1911); *The Theology of the Gospels* (1912), being lectures delivered at Glasgow; a new version of the New Testament (1913); *Expositor's Dictionary of Poetical Quotations* (1915).

MOFFETT, Cleveland (Langston) (1863–). An American journalist and author, born at Boonville, N. Y., and educated at Yale, where he graduated in 1883. From 1887 to 1892 he was connected with the New York *Herald*, for four years on the European staff and for a year on the New York staff. In 1893–94 he was foreign editor of the New York *Recorder*. Magazine work then engaged him for a time, but he returned to the *Herald* as Sunday editor (1908–09). In the meantime, and subsequently, novels and plays came from his pen: *Real Detective Stories* (1898); *Careers of Danger and Daring* (1901); *A King in Rags* (1907); *The Battle* (1909); *The Bishop's Purse* (1913); and the plays: *Money Talks* (1906); *Playing the Game* (1907); *The Battle* (1908); *Greater than the Law* (1912). He also translated Bourget's *Cosmopolis* (1894).

MOGADOR, mŏg-ȧ-dōr′, or Suera. The principal seaport of Morocco, situated on the Atlantic coast, 120 miles west-southwest of the city of Morocco, of which it is the port (Map: Africa, C 1). It is built on a rocky promontory, surrounded on the land side by sand dunes. A channel between the town and a neighboring island forms the harbor. Mogador is the best-built town of Morocco, having been planned by a French engineer in 1760. A part of it, the Kasbah or castle, is surrounded by walls and contains the residences of the Moorish officials and of the protected Jewish and Christian merchants. Most of the Jews, however, live in a separate quarter of the city. Its equable climate renders it a health resort which is becoming increasingly popular with European sufferers from tuberculosis. The trade of the city is considerable and is mostly with Great Britain and France. The principal exports are olive oil, almonds, gum arabic, hides, goat skins, and wool. The city occupies the site of a much older town. In 1844 it was bombarded by the French. Pop., about 22,000, nearly half of whom are Jews.

MOGILA, mo-gē′là, or **MOGILAS,** Peter (c.1597–1647). A Russian theologian. He was born in Moldavia, of a noble Wallachian family, and was educated at the University of Paris. After serving in the Polish army he went into a monastery at Kiev and became metropolitan of that see in 1629. He set up a printing press and founded an academy and a library, to which he gave his own collection of books. He published a catechism in 1645 and other minor works. His great title to fame rests upon the *Confession of Faith of the Greek Church*, which was drawn up at his instance by the Abbot Kosslovski of Kiev, approved at a provincial synod in 1640, and accepted by the patriarchs of Constantinople, Jerusalem, and Antioch in 1642–43 and by the Synod of Jerusalem in 1672. It has been edited in Greek and Latin by Panageotes (Amsterdam, 1667) and Hoffmann (Leipzig, 1695). A German translation by Frisch appeared at Frankfort in 1727. It is given by Von Kimmell in *Libri Symbolici Ecclesiæ Orientalis* (Jena, 1843).

MOGK, mȯk, Eugen (1854–). A German philologist, born at Döbeln, in Saxony. He was educated at the University of Leipzig; worked in 1879–80 in the libraries of Copenhagen, Stockholm, and Upsala; and became a teacher in the Leipzig Realgymnasium in 1883 and professor of Norse philology at the University in 1893. He edited the *Altnordische Saga-Bibliothek* (1891 et seq.) and *Altnordische Texte* (1886–90). To Paul's *Grundriss der germanischen Philologie* he contributed important monographs on the literature of Iceland and on Germanic mythology. He also wrote *Die deutsche Sitten und Bräuche* (1907) and *Das Menschenopfer bei den Germanen* (1909).

MOGOK, mō′gŏk. The capital of the District of Ruby Mines, Upper Burma, India, 36 miles east of Irrawaddy (Map: Burma, C 2). The town lies in a valley at an altitude of 4000 feet above the sea. It is a collection of 9 villages and is the headquarters of the ruby mines of Burma, which are controlled by the Ruby Mines Company, a European enterprise which has introduced complete modern mining equipment with hydroelectric power furnished by the Yeni stream. Pop., 1901, 6078; 1911, 11,069.

MO'GONTI'ACUM. The Roman name of Mainz.

MOGUL′, Great (more correctly *Mughal*, or *Moghul;* Hind. *Mughal*, from Mongol *Mongol*, Mongŏl, from *mong*, to be brave). The popular designation of the Emperor of Delhi as the impersonation of the powerful empire established in Hindustan by the Mongol conqueror, Baber, the great-grandson of Timur, in 1526. The most important princes of this line, after Baber (the first Great Mogul), who died in 1530, were Akbar (1556–1605), Jehangir (1605–27), Shah Jehan (1628–58), and Aurungzebe (1658–1707). In 1803 the Great Mogul, Shah Alam II, was deprived of his throne, and in 1827 he surrendered even the appearance of authority, becoming a pensioner of the British. In 1857 Mohammed Bahadur, the last of the dynasty, who had been invested with the Imperial dignity at Delhi at the outbreak of the Sepoy Mutiny, was condemned for his complicity in the mutiny and transported to Rangoon, where he died in 1862.

Bibliography. H. G. Keene, *History of the Mogul Empire* (London, 1888); Stanley Lane-Poole, *History of the Mogul Emperors* (ib.,

1892); Horn, *Das Heer- und Kriegswesen der Grossmoguls* (Leyden, 1894); E. S. Holden, *The Mogul Emperors of Hindustan* (London, 1895); Haidar, *History of the Moguls of Central Asia* (ib., 1898). The *Bábar-Náma*, or autobiography of Baber, was published by Beveridge (London, 1905), while Mannucci's *Storia do Mogor*, or *Mogul India, 1653–1708*, has been translated by Irvine (3 vols., ib., 1906–07).

MOGULES'KO, SIGMUND (1858–1914). A Jewish-American actor, born in the Province of Bessarabia. When he was nine years old, his musical talent was discovered by a famous cantor visiting the town. After several years of early training Mogulesko entered the Bucharest Conservatory of Music, and at 14 was already intrusted by the local cantor with the leadership of a choir of 20 voices, besides performing a similar function in an opera chorus. Six years later, with the opening of a Jewish theatre at Bucharest (the first of its kind in the world), his desire to go on the stage was realized. For seven years he played in Russian, Rumanian, and Galician cities, and in 1885, when Jewish theatricals were forbidden in Russia, settled in the United States. Mogulesko, though a character actor, was essentially a comedian. His art was spontaneous, not studied. He was undoubtedly one of the greatest Jewish actors since the founding of Jewish theatres. He composed some *entr'acte* music, which has been frequently played in New York theatres.

MOGYORÓSSY, mŏg'yô-rŏs'ĭ, ÁRKÁD (1851–). A Latinist, better known as Arcadius Avellanus. He was born at Esztergom, Hungary; learned Latin as a child, finishing his education in Hungary; and, having come to the United States, was editor and publisher in Philadelphia (after 1894) of the *Præco Latinus* (or *Latin Herald*), a Latin periodical for promoting the adoption of this language for speaking. Mogyoróssy's publications include: *Palæstra: A Primer for Spoken Latin* (1893–1915); *Arena Palæstarum* (1893); *Robinson Crusœus* (1897); *Medulla* (1898); *The Colloquia of Maturinus Corderius, the Teacher of John Calvin* (1904); *Fabulæ Tusculanæ* (1913); translations into Latin of Ruskin's *King of the Golden River* (1913) and of *The Adventures of Captain Mago* (1914), an account of an imaginary journey of a Carthaginian sailor to Spain.

MOHÁCS, mô'hächh. A grand commune and market town in the County of Baranya, Hungary, on the right bank of the Danube, 23 miles east-southeast of Fünfkirchen (Map: Hungary, F 4). It is poorly built, but is a railway junction point and an important station for steamers. It manufactures silk, lumber, and bricks and is the centre of the coal trade of the Fünfkirchen district. It is noted as the scene of the battle of Aug. 29, 1526, between the Hungarians under Louis II and the Turks under Solyman the Magnificent. The King and 24,000 Hungarians and Germans perished, and a large part of Hungary fell under the yoke of Turkey. On Aug. 12, 1687, a second battle was fought at Mohács, in which the Imperialists under Charles of Lorraine defeated the Turks, thereby putting an end to the Turkish dominion in central Hungary. Pop., 1900, 15,832; 1910, 17,092.

MO'HAIR (OF. *mouhaire, mouaire, mohere*, Fr. *moire*, from Ar. *mukhayyar*, fabric of goats' hair). The wool of the Angora goat (see GOAT) of Asia Minor and South Africa. Few animals have so beautiful a covering as the fine, soft, silky, long, and usually pure white fibre of this goat. Each animal at the annual clip in April or May yields from two pounds to four pounds of wool. The fabric *mohair* made from this wool is characterized by its light weight, smooth, dust-shedding surface, and lustre. In pile fabrics, such as plushes and astrakhans, mohair is sometimes used for the pile warp, while the body is made of cotton. The fabric known as camel's hair is made from the best mohair, which enters into the manufacture of many fabrics. Mohair is used as a substitute for human hair in switches and wigs. Consult "The Angora Goat," *United States Department of Agriculture, Farmers' Bulletin, No. 137* (Washington, 1901). For the production of mohair in the United States, see WOOL.

MOHAM'MED (Ar. *Muḥammad*, praised, approved, or endowed with praiseworthy qualities). The founder of Islam. It is not certain whether Mohammed was his original name or a cognomen given him in the latter part of the Meccan period. Some scholars, among them Huart (*Histoire des Arabes*, p. 90, Paris, 1912), think that his proper name has remained unknown, or possibly was Ḳutham. Others, like Nöldeke (in *Der Islam*, p. 160, Strassburg, 1914), maintain that Mohammed was his real name. If reliance can be placed upon the statements that he was about 63 years old when he died, the traditional date of his birth, 570 A.D., would be approximately correct. But tradition also connects his birth with "the year of the elephant." The march upon Mecca by Abraha, the Abyssinian ruler of Yemen, at the instance of Justinian, who was at war with Khosrau I, must have occurred before 562. It is therefore doubtful when the prophet was born. His birthplace was undoubtedly Mecca. He was the son of Abdallah, of the family of Hashim, and Amina, of the family of Zuhra. There is no reason to doubt that both belonged to branches of the powerful tribe of the Koreish. His father, a poor merchant, seems to have died before Mohammed was born; and his mother, following the custom of her tribe, is said to have given the child to Halima, of the tribe of the Banu Sa'd, that she might nurse him in the healthful air of the desert. A few years afterward his mother died. His grandfather, Abd al Muttalib, adopted the boy; and when the grandfather died, Mohammed's uncle, Abu Talib, a man of influence, though poor, took him into his house and remained his friend and protector as long as he lived. Concerning Mohammed's youth we have no trustworthy information. It is probable that he was about 25 years of age when he entered the service of a rich widow named Khadija, who was also of the Koreish, and accompanied her caravans, perhaps as a camel driver, to the fairs. In these travels he is said to have met a Christian monk, Nestur, and this is likely to be true. Whether his journeys took him to Syria, to Hira, and to Yemen cannot be determined with certainty, but is not improbable, and Nöldeke suggests that he may have been even to Abyssinia. Khadija, who was older than Mohammed and twice widowed, offered him her hand, which he accepted. It was a happy marriage. As long as she lived he took no other wife. According to tradition, she bore him three sons, al Ḳasim, al Ṭahir, and al Ṭayyib, and four daughters, Zainab, Ruḳayya, Umm Ḳulthum, and Fatima. Ḳasim died before Mohammed's

prophetic ministry began. Al Ṭahir and al Ṭayyib are probably fictitious names. The daughters grew up, but only Fatima seems to have left any issue. Mohammed conducted Khadija's business with success and his surname al Amin (the faithful) seems to indicate the high esteem in which he was held for his integrity and good judgment.

The story of Mohammed's life from the time when the first revelations came to him until the emigration to Yathrib (Medina) is better known than that of his youth and early manhood, but is still very obscure and full of uncertainty, both as to the events and circumstances and in regard to the inner development. There are indeed numerous suras, or chapters, of the Koran that unmistakably come from this Meccan period, extending perhaps from 610 to 622 A.D., and it is even possible to distinguish between an earlier and a later group among these suras. These oracles, which in the main, no doubt, have come down to us in their original form, are invaluable testimonies, but do not yield much information concerning the succession of events or the growth of Mohammed's prophetic consciousness, and contain many allusions that cannot be understood without knowledge drawn from other sources. The collections of tradition (*hadith*), the early biographies (*sira*), and the exegetical elucidations in the commentaries on the Koran (*tafsir*) have been widely used as such extraneous sources; but the searching analysis of the *hadith* by Goldziher and the more recent investigations of the *sira* and the *tafsir* by Lammens (see HADITH) have led many eminent scholars to assume a more radical position than heretofore. A cautious and circumspect criticism must manifestly seek to steer its way between a skepticism tinged with prejudice and a generosity touched with apologetic interest to a purely historical viewpoint. While in a certain sense it still may be said that Islam is the only great religion born in the broad daylight of history, there are many serious obstacles in the way of securing a conception of Mohammed's life based throughout on well-authenticated facts and of securing a fair and carefully considered estimate of his character.

Vague and inadequate as our knowledge is concerning the undercurrents of religious life among the Arabs in the period immediately before the appearance of Mohammed, we are not wholly without evidence as regards some of the tendencies that prepared the way for the great prophetic movement. While the Arabian Jews mentioned in Acts ii. 11 may have come from Arabia Petræa, it is certain that the Jewish tribes Kainuḳa, Nadir, and Kuraiza had been settled in Yathrib long before the immigration of Mohammed, other settlements existed at Khaibar, Fadak, and Taima, and in Yemen there were Jewish colonies as early as the fourth century A.D., and a Jew, Yusuf dhu Nuwas, reigned in Saba 520–525 A.D. Through the Abyssinian conquests in Yemen Christianity spread into Nejran, and in the north the Ghassanids were at least nominal Christians. From Egypt and Syria Jews and Christians came as slaves or as merchants to Mecca. The Aus and the Khazraj in Yathrib seem to have come from Yemen, and Mazdaism is likely to have become known there through Sassanid influence before Christianity came in with the Axumites. Even the Sabians, or Mandæans, on the lower Euphrates, are likely to have been known to the Laḥmids in Ḥira and the Arabs employed by them. The poets seem to have been especially subject to the foreign impact. Every *kahin* (diviner) or *sha'ir* (knowing one) cannot of course be supposed to have sung altogether after the fashion of the Moallakat (q.v.), and it must be remembered that the remnants of pre-Islamic poetry have been copied by Moslem hands; but the reticence about local divine names and the use of a neutral expression like Allah (*al ilahu*, 'the god,' 'the deity') by the great poets may be original and not wholly due to expediency on the part of singers called upon to recite their poems to Jewish and Christian audiences, but to some extent to a broadened outlook. The poems of Umayya ibn Abu'l Salt, recently collected, edited, and translated by Schultess (Leipzig, 1911), obviously composed for the edification of Arabs in the time of ignorance, and not intended for Jewish or Christian ears, reveal indeed such a familiarity with biblical lore that it is not impossible that they were one of the sources of Mohammed's knowledge. Although it is extremely difficult to sift the tradition as to the *ḥanifs*, two facts seem to be well established: the name was for some reason given to such men as Waraka ibn Naufal and Zaid ibn 'Amr who, without being either Jews or Christians, were opposed to polytheism and idolatry, and Mohammed himself used the term of Abraham as a worshiper of one god and not an idolater, as well as of his own followers, the Moslems. In Hebrew the word *ḥanif* designates a wicked, impious, godless person, an apostate from the faith; in Aramaic it acquired the special sense of heretic; in Arabic it may also have carried the meaning of one fallen away from the ancestral faith and practice or inclining to a monotheistic belief, the term of reproach becoming one of special honor on the lips of the prophet. There were, no doubt, many such *ḥanifs*, obscure forerunners of Mohammed in Arabia.

It was possibly about 610 A.D. that Mohammed began to be disturbed by certain experiences that came to him. As the result, apparently, of a physical malady he had hallucinations, he heard strange sounds as of the ringing of great bells, a voice seemed to speak to him, a spirit sought to take possession of him. At first he appears to have conceived of this spirit as a *jinn*, and of himself as called to become a poet, a seer, a diviner, as so many others. The tradition of such an original conception lived long at Mecca. But he gradually seems to have become impressed with the idea that it was no ordinary *jinn* producing poetic inspiration whose voice he heard, but that of "the faithful spirit," "the spirit of holiness." Later this being was identified as Gabriel. We have no means of determining which is the earliest of the suras. But the opening words, though not the whole, of Sura xcvi may well claim to represent one of the oldest of Mohammed's recorded revelations. These words have sometimes been translated "Read, in the name of thy Lord." But there can be little doubt that they should be rendered "Recite (or proclaim), in the name of thy Lord." That the revelations came through the ear is the unanimous testimony of Moslem tradition; and Suras lxxv, 16 ff.; xx, 113; xxv, 34 clearly show that the process of revelation includes a reciting from the heavenly book by the spirit and repetition of what he has heard by the prophet. This has been emphasized by

Snouck Hurgronje and Nöldeke, and most recently in a very convincing manner by Pedersen (in *Der Islam*, Strassburg, 1914, pp. 110 ff.). Mohammed does not seem to have known how to read and write, but he knew how to proclaim in a very impressive manner what he was convinced that he had heard. The elevated prose he employed, approaching poetry in its rhythmic swing, its assonance, and frequent rhyme, naturally produced the impression upon those to whom he confided his visions that he was a poet inspired by a *jinn*.

It was only after inner struggles, testifying to the genuineness of his ecstatic experiences, that he thus revealed what had happened to him even to his wife Khadija, his friend Abu Bekr, and his cousin Ali, who encouraged him by their confidence. That he was receiving revelations from the heavenly book naturally created in him the conviction that he had been chosen by his Lord as an instrument to make known to his people the contents of this book, as others had to other nations, and that the message sent down to diverse persons at different times must be essentially the same, as it came from the same source, which could contain no contradictory statements. He consequently identified himself with an order of messengers to whom he counted not only Abraham, Moses, and Jesus, but also Hud, who was sent to Ad, and Salih, who was sent to Thamud, and others. It may not have been until he left Mecca that he assumed definitively such titles as *al nabi* (*the* prophet) and *rasul Allahi* (the messenger of Allah). His message did not centre about himself, but about Allah, and not so much about his nature as about his authority, his righteous demands, the inevitability of his judgment, and his mercy to those who believe his messengers. Allah's rights are based upon the fact that he is man's creator. Through some channel, possibly a physician, Mohammed had obtained a knowledge, unusual in his age, of embryogeny. In view of this constantly recurring wonder of man's embryonic development, he found it easy to believe in a re-creation of man in the resurrection of the dead. The purpose of this resurrection could only be a judgment upon man's earthly life, the sentence to eternal punishment in hell or the acquittal and gracious gift of eternal life. With deep earnestness he realized the terrible danger of man's plight, the need of divine guidance, and the wonderful mercy of Allah. To his quickened moral sense it became clear that the issues of life depend upon the line of conduct that is followed. He looked with horror upon many practices prevalent in the community, such as murder, theft, adultery, exposure of female children, cruelty to women, dishonesty in trade, lying, usury, oppression of the poor, luxury, gluttony, and drunkenness; and he believed that only by a surrender of self to Allah (*islam*), by abandoning idolatry and seeking in prayer and meditation, after the fashion of the *ḥanifs*, to be guided aright, by encouraging one another to patience and well-doing, and by acting justly and mercifully, would it be possible to lead a life acceptable to Allah. As for himself, he had no further duty than to announce his message, to warn and exhort; he had no right to use force. Having been an orphan and poor himself, he could sympathize with those who were neglected and ill treated; having been honored by his Lord, he proclaimed, with fear and trembling, yet with unmistakable gratitude and love, what came to him in moments of trance and ecstasy. How genuine these experiences were may be judged from the fact that the oracles sometimes contained rebuke of himself—his pride and indifference in turning away a beggar, his unseemly eagerness for revelations, his failure at times to distinguish between the voice of the spirit and that of the devil. There is no reason to doubt that after reciting the words "Have you seen al Lat and al Uzza, and that other, al Manat, the third idol?" (Sura liii, 19 f.), he once added: "These are the exalted princesses, and their intercession is desired" (Tabari, 1, 1192, 1195), but later announced that he had been reproached by the spirit for having uttered these words, by consequence of which they have disappeared from our present text of the Koran.

While the accounts of persecutions may be exaggerated, there can be no question that much disapproval was expressed, much mockery was indulged in, and occasionally violence was resorted to by the unbelieving Koreish. Finally the family of Hashim seems to have been forced into the part of Mecca called "the ravine of Abu Talib." This application of the principle of the Ghetto may have been dictated by fear of evil consequences to the community from Mohammed's blasphemies against gods and goddesses, or from the free association of men of different clans who had the same religious opinions which manifestly threatened the tribal organization, as well as by resentment because of what seemed like personal abuse, the consignment of their parents to hell, and an attack upon their prestige and revenue. A considerable number of the Moslems emigrated to Abyssinia, where they were well received by the Negus. Some of these returned many years later, some became converts to Christianity, and some, at least temporarily, relapsed into paganism. It was probably exclusion from the Ka'ba that caused that strange experience of the Prophet when, whether in the flesh or out of the flesh he probably did not himself know, he was carried away in a night to Jerusalem. Neither his enemies who laughed at him, nor Abu Bekr who vouched for the accuracy of his description, nor he himself, probably, could tell what actually happened; and we do not know whether Mohammed ever was in Jerusalem. Three years the boycott lasted; then a compromise was effected. But after the death of Khadija, about 619, and of Abu Talib, a little later, Mohammed naturally sought for other allies and protectors, and he first attempted to reach the tribe of Thakif at Ṭaif. When this proved to be in vain, and his uncle Abu Lahab refused to protect him, he at last entered into negotiations with the pilgrims who came to Mecca from Yathrib, some of whom had come under the influence of his teaching. The invitation to Mohammed to become the political and religious head of Yathrib did not come as the result of a town meeting, but of a conspiracy. There was no plebiscite, but there is likely to have been a secret agreement between the local Moslems and some of the more eminent leaders of the Aus and the Khazraj and possibly also of the Jews. An oath of allegiance was given by the conspirators on behalf of the Banu Kaila at the second meeting of Akaba, near Mecca; and Mohammed then undertook to remove some 150 of his followers from Mecca to Yathrib. He remained in the city himself until the last of the emigrants had left; then he

cautiously picked his way, together with Abu Bekr, to his new home. After his arrival in Yathrib he sent to Mecca for his wife Saud and his daughters. There is no evidence of any effort on the part of the Koreish to prevent this departure. It was not a flight from persecution, but a deliberate removal, a voluntary emigration, as the word *hijra* implies. As to the date, it is certain that it occurred in the month of Muharram, 622 A.D.; but the calendar instituted 17 years later by Omar begins the year on the first of Muharram, i.e., fifth of July, which may or may not have been the date of Mohammed's leaving Mecca.

Concerning Mohammed's life in Yathrib, which now becomes known as *Medinat al nabi* (the city of the prophet) or simply *al Medina*, we are better informed than in the case of any other period of his career. There are indeed many gaps in our knowledge; many legends formed especially about his last illness and death; the stories of his domestic troubles have no doubt been colored in transmission by the prejudices and interests of rival factions; and some of the letters said to have been dictated by Mohammed may be suspected of being fictitious. But we possess a very important document in the treaty of Mohammed and the emigrants from Mecca with Yathrib, a kind of charter of the new community, preserved by Ibn Hisham (ed. Wüstenfeld, pp. 341 ff.) and translated by Wellhausen (*Muhammads Gemeindeordnung von Medina*, Berlin, 1889). The bulk of the correspondence of Mohammed preserved by Ibn Ishak, al Wakidi, and Ibn Sa'd, and translated by Wellhausen (*Ibn Sa'd, die Schreiben Muhammads und die Gesandtschaften an ihn*, Berlin, 1889), is no doubt genuine. Poems by enemies like Ibn Ziba'ra and Umayya ibn Abu'l Salt copied by Moslem historians are of distinct value. The historical character of accounts of defeat and of dishonorable deeds calling for an apology cannot well be questioned; and the excellence of early Arabic historiography is quite remarkable.

The emigration to Medina brought with it a notable change in the Prophet's position. He became the civil head of a community. This *umma*, or community, consisted of the followers of Mohammed, called Koreish, *muhajiruna* (emigrants), or *aṣhab* (companions); further, the Banu Ḳaila, i.e., Khazraj and Aus, made up of believers called *anṣar* (helpers), and others spoken of as *munafikuna* (doubters, vacillating ones), and various Jewish tribes considered as clients of the Banu Ḳaila. The "emigrants" broke their natural tribal relations in Mecca and entered into a fictitious brotherhood (*ḥuwa*) with the Yathribine "helpers." In the new charter Mohammed was referred to as "the Prophet." It was therefore unavoidable that the community became a theocracy: not a hierocracy, however, under foreign rule, as Judæa in the Persian period, nor a government by a priestly ruler, like the Hasmonæans, but an independent state whose civil and religious life is ordered by divine oracles that come through a prophet, resembling to some extent the theocracy of Florence in the days of Savonarola's power. This must be borne in mind if Mohammed's activity in Medina is to be understood and his character fairly judged. At Medina he became more fully acquainted with Judaism, and probably in a measure also with some form of Christianity. He sought to gain the Jews, and at first made some notable converts; but he laid himself open to ridicule by maintaining that he knew that certain things could not be in the Law of Moses, but must be falsely ascribed to the legislator, since they did not agree with the revelations he had received from the heavenly book. In this he betrayed ignorance, but not insincerity, as the insistence by good men upon absolute harmony between all divine oracles is of very common occurrence in all religions. Allah could not contradict himself.

It became a serious question how much contradiction, mockery, and blasphemy his prophet, now responsible for the order and welfare of the community, should endure in patience. His disappointment in not seeing the Jews in larger numbers embracing Islam may have led him to change the *ḳibla* (see KIBLAH), or direction in prayer, from Jerusalem to Mecca, though it would not be strange if, entirely apart from this, a conviction should have grown up in his mind that the Ka'ba, purged from idolatry, would be the most acceptable temple of Allah on the earth. Neither was he quite certain how far the rules and conventions of the period of ignorance were still binding upon Moslems. At first he hesitated to justify the infraction of the customary month of truce; later he minimized the guilt by magnifying the sin of those who had rejected Allah and driven out his people. The problem whether a state, and he as the head of a state, had the right to engage in war probably never occurred to his mind, either in a trance or in a waking condition. The Koreish of Mecca were the enemies of Medina; they had made themselves the enemies of Allah. In the battle of Bedr in February, 624, they were defeated by a small band of Moslems. Allah had given them victory, though the Koreish had greatly outnumbered them. Similarly, Mohammed is not likely ever to have considered whether the *lex talionis* could be set aside altogether, or even whether private blood revenge, the law of the desert, could be abolished. When, as the result of a quarrel, one of the Banu Ḳainuḳa, a Jewish tribe, had been slain by the Moslems, and these had in turn killed the murderer, revenge for the Moslem was sought. The Ḳainuḳa fortified themselves, were besieged by the Moslems, and finally forced to emigrate to Syria, their property being confiscated and given to the Muhajira, who thus were freed from their dependence upon the Banu Ḳaila.

At Ohod, in 625, Abu Sufyan and the Koreish gained a victory over the people of Medina. The Prophet was wounded and had to hide himself. When this misfortune was laid up against him by the "doubters" and some of the Jews of the tribe of al Nadir as a sign that he was not a true prophet, Mohammed gave indeed counsels of moderation to his zealous followers, and knew how to change the defeat into a moral victory by explaining that the cause of the disaster was the lack of faith in Allah, but he did not forget the attitude of the al Nadir; and when they refused to furnish their share of money needed as compensation for a case of manslaughter by error, their palm trees were ultimately cut down and they were driven out of Medina. Mohammed unquestionably did much to improve the conjugal relations of his people, by abolishing mota marriages contracted for a brief period, punishing adultery, forbidding fornication, limiting the number of wives to four, regulating divorce, insisting upon the rights of wives, and protect-

ing children. It is significant that, when one of the tribes indicating its willingness to accept Islam sought to secure a concession in favor of fornication, he refused with indignation to accede to their request. But his growing conception of holding a unique position in Allah's favor led him to feel that Allah would grant him exceptional privileges. Unselfish and abstemious, he asked little for himself in other respects, but his excitable erotic nature made large demands upon divine clemency and generosity. He not only increased the number of his wives beyond that permitted by Allah to others, but also took to himself Zainab, the wife of his adopted son Zaid ibn Harith, whom he had surprised in the bath. Zaïd promptly offered to divorce her; Mohammed hesitated, but received a general dispensation covering all such cases; and Zainab afterward tried to poison him, proudly giving her reasons for this act. The suras of the period hint at many domestic troubles, which are more or less accurately explained by the tradition. His sensitiveness to ridicule also made him miserable and led him to countenance the removal of offending poets through zealous Moslems, if not to incite feuds by which he could get rid of them.

In 627 "the war of the trenches" broke out. The Banu'l Nadir had found a refuge in Khaibar, but longed for revenge, and entered into a coalition with the Koreish, the Banu Sulaim, and the Banu Ghatafan. With something like 5500 men they marched against Medina. The city seemed to be doomed, as it had no wall, and the buildings could be united for defense only on one side, while the others were altogether open. Then a Persian slave, Salman al Farisi, suggested the idea of digging a trench. Such a device was called in his language, the Pahlavi, *kandaḳa*. The siege lasted about a month. Mohammed made peace with the allies of the Koreish, and these returned to Mecca without having accomplished anything. While the war was going on there were diplomatic conversations between the Koreish and the Banu Kuraiza, the last important Jewish tribe in Medina. These demanded hostages of the Koreish, which they refused to give. The matter came to the attention of Mohammed, who besieged them for 25 days. When they finally surrendered without condition their men were to be executed and their women sold into slavery, though it is doubtful whether the sentence was actually carried out. Successful raids were then made in various parts of Arabia.

In 628 Mohammed desired to make a pilgrimage to the Ka'ba. He started with a large number of followers, and encamped in the plain of Hudaibiya. From there Othman was sent as an ambassador to deal with the Koreish, who had come out in large numbers ready for battle. He secured a treaty of peace for 10 years, and the right for Mohammed and the Moslems to hold possession of the city of Mecca and the Ka'ba for three days the following year, with the duty of returning Koreishite fugitives. Not realizing the advantages gained, but deploring their return without booty, the Moslems were dissatisfied with this treaty of Hudaibiya. Mohammed, therefore, sent them against the Jewish city of Khaibar, which they captured and plundered. The pilgrimage was made the following year (629) by 2000 Moslems, and made so strong an impression in Mecca that two of the leading generals of the Koreish, Amr and Khalid, soon appeared in Medina and embraced Islam. It is possible that, when the news reached Arabia of the defeat and expulsion of the Persians by Heraclius, Mohammed sent a message to the Byzantine Emperor calling his attention to the prophecy he had made several years before of this victory of the Greeks (Sura xxx, 1 ff.), and that his messenger was slighted. There can be no reason to doubt that he dispatched a messenger to the Ghassanid King at Bosra, Amr al Harith, for the murder of this ambassador led to the expedition into the east Jordan country which ended in the ignominious defeat at Muta in September, 629. The letters said to have been sent to Khosrau Parvez, the Sassanid King, and to the Negus of Abyssinia, as well as the answers, may be spurious, but the fact that embassies were dispatched can scarcely be doubted. The Mukaukis of Egypt, possibly the head of the Coptic church, must have received a message, since he sent him several female slaves, one of whom, Mary, bore him a son, Ibrahim, who died at the age of 18 months. Haudha ibn Ali, King of Yemama, proposed a peaceful division of Arabia between them, which Mohammed declined; al Mundhir, the Lahmid King at Hira, received a message from him. On the other hand, he also received many deputations from different parts of the peninsula seeking alliance with him. In 630 a quarrel between the Koreish and the Khuza'a, who were in alliance with Mohammed, was construed by him as a breach of faith on their part, and justified him in "cutting loose from the idolaters" (Sura ix, 1 ff.). He marched against Mecca in January, 630, with an army of about 10,000 men. Abu Sufyan was sent to discover Mohammed's design; he went over to Mohammed's side, and when he returned to Mecca presented the situation in such a light that the city capitulated. As it was impossible to allow the victors to pillage the city, which had not been defended, Mohammed imposed upon it a war indemnity, levying large sums from the richer citizens. He proclaimed a general amnesty from which only 10 were excepted, among them two female singers who had chanted derisive songs about Mohammed. Abdallah ibn Sa'd, who had been Mohammed's secretary in Medina, transcribing his revelations, but had been accused by the Prophet of reproducing them inaccurately, had renounced Islam and fled to Mecca. He was now an apostate and deserved death, but was finally pardoned after long and earnest efforts on the part of Othman. Abdallah's return to his ancestral faith may have been due to a too intimate acquaintance with the manner in which the later revelations came and were reproduced. While Mohammed in Medina never seems to have doubted his mission or lost the sense of being inspired, as did Savonarola after the fateful decision in the case of the Medici, the nature of these later discourses is such that it is extremely improbable that, as a rule, they were the result of ecstatic experiences like those of the Meccan period. He was no doubt subject at times to similar trancelike conditions; and occasional signs are not wanting of the power, originality, and freshness characteristic of the earlier days. But in the main these suras show by their length, monotonous repetition, shrewd wording, careful elaboration, and flowing style that they are homilies rather than oracles, apologies for the faith and practice of the Prophet rather than inspired utterances.

Medina remained the residence of Mohammed and the capital of the state even after the capture of Mecca. The adhesion of new tribes enlarged this growing empire. Taif was besieged and taken. There are grave doubts about some of the details of the reported campaign against Tabuk, but the expedition itself is certainly historical. In 632 Mohammed determined to make the pilgrimage to Mecca. He had performed the *'umra*, or pious visit, possible at any time of the year, before, but now for the first time he undertook, at the head of many thousand Moslems, the formal pilgrimage, with its holy rites, the procession around the Ka'ba, the run between Safa and Merwa, the visit to Mount Arafat, where he laid down the laws and ordinances concerning the pilgrimage, the meditation during the night at Muzdalifa, the stoning of the devil in the valley of Mina, the sacrifice, the shaving of the head and cutting of the nails, and the drinking from the well Zemzem. (See ARAFAT; HAJJ; KAABA.) He was apparently conscious that his work was done; for after many exhortations to his followers to protect the weak, the poor, and the women, to abstain from usury, and to live a righteous life, he is said to have closed his prayers with the words: "Oh, Allah! Have I not completed my mission?" to which the people answered: "Yea, Allah." Soon after his return to Medina he was taken ill with pleurisy. But neither the remedies tried, such as the pouring of water over him and the injection of medicine in Abyssinian fashion, nor the care given him, in eager and loyal, even though not wholly unselfish, rivalry, by Ali and Fatima on the one hand and Ayesha, Abu Bekr, and Omar on the other, could help him, and he died on Monday, June 8, 632 (13th Rebi' I, 11 A.H.) in the arms of Ayesha, and was buried in her house Tuesday night. His death created a serious situation, as he had not indicated his wish, or Allah's will, in reference to a successor. While Ali's claims were urged in the council by Talha and Zubair, he undertook himself, as the nearest of kin, the embalming and burial of the Prophet; through Omar's influence Abu Bekr was chosen as Caliph (*khalifa*), "representative" of, or "substitute" for, Mohammed.

Mohammed is described as of middle height, lean, but broad-shouldered, with a well-developed head and somewhat curly hair. His eyes were large and black, his nose was prominent, slightly aquiline, and finely formed. He wore a long beard, which added to the dignity of his appearance. A black mole between his shoulders became known among Moslems as the "seal of prophecy." He is praised for his amiability, his loyalty to friends, his frequent readiness to forgive an enemy, his tenderness towards his family, his great generosity, his kindness to the poor, his care of orphans, the simplicity of his domestic life. Even after his removal to Medina he lived in simple quarters, mended his own clothes, and freed all his slaves. He had himself refrained from the use of wine and strong drink long before he imposed total abstinence upon his followers, for military reasons, in order to improve their discipline and fighting qualities. He shared with his men the hardships of warfare, though his physical bravery was never quite equal to his moral courage. He had the defects of his qualities. His remarkable practical sagacity and shrewdness sometimes degenerated into cunning and deceit. The extraordinary intelligence which enabled him, the unlettered camel driver, to produce a literature also permitted him at times to indulge in disingenuous apologetics. His keen sensibilities and rich gifts of imagination made him occasionally irritable, melancholy, suspicious, and revengeful. With his deep earnestness he could not understand those who trifled or acted the part of hypocrites; the enemies of Allah became his enemies. The more convinced he became that his inspiration differed from that of the poets and the diviners, that he was possessed by a holy spirit and not by a *jinn*, the more horrible, blasphemous, and unendurable seemed to him the mockeries of those Jewish and pagan poets who made his life so bitter. The affectionate nature, strongly rooted in the life of the senses, which for many years had found its full satisfaction in Khadija's love, after her departure sought for gratification in many directions, but he may not have been conscious of any inconsistency between Allah's permitting all believers to have four wives and his graciously granting the Prophet a few more, and from his knowledge of what he considered Allah's revelation to the Jewish people he did not gather that there was in the heavenly book a prohibition of polygamy as such, nor is there any evidence that he was familiar with the views of Jesus on the subject. From his fundamental conception of the process of revelation followed, not only the recognition of Judaism, Christianity, and Sabianism, i.e., Mandaism, as permitted religions, and toleration of those who professed them as the *ahl al kitabi* (the people of the book), the recipients of a revelation from the heavenly book, but also suppression of paganism as a *religio illicita*, and the *jihad*, or holy war, against idolaters, not accounted worthy of such a revelation. The very conviction that he had been intrusted with a message to his people and to mankind, was indeed a prophet like those who had been sent in earlier times, and as the latest of the prophets the one to whose voice his contemporaries were especially bound to listen—a conviction that has influenced the world profoundly during thirteen centuries—evidently tended to produce in his own mind the idea that he held an exceptional position among the sons of men, involving peculiar duties and compensating privileges. With all his serious limitations and aberrations, the essential sincerity of his nature cannot be questioned; and an historical criticism that blinks no fact, yields nothing to credulity, weighs every testimony, has no partisan interest, and seeks only the truth, must acknowledge his claim to belong to that order of prophets who, whatever the nature of their psychical experience may have been, in diverse times and in diverse manners, have admonished, taught, uttered austere and sublime thoughts, laid down principles of conduct nobler than those they found, and devoted themselves fearlessly to their high calling, being irresistibly impelled to their ministry by a power within.

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MOHAMMED. The name of five sultans of Turkey.—Mohammed I was the son of Sultan Bajazet I, who was defeated and captured by Timur in 1402 and died in captivity in 1403. Mohammed I, after sharing the supreme power with his brothers, became sole Sultan in 1413. He reigned until 1421. He consolidated the Empire, which had suffered from the inroad of Timur.—Mohammed II (c.1430–81) was Sultan from 1451 to 1481. He was surnamed *El-Ghazi*, i.e., conqueror (of infidels), and also *Buyuk*, i.e., the Great. He was born at Adrianople and succeeded his father, Amurath II. His first acts were the murder of his brother and the suppression of a rebellion in Karamania. Having thus secured himself on the throne, he bent all his energies in order to effect the capture of Constantinople. This city was now the sole remnant of the once mighty empire of the Cæsars, and after more than a year spent in preparations, Mohammed commenced the siege on April 6, 1453, with an army of about 70,000 and a fleet of 320 vessels. The Greeks, aided by gallant bands under Gian Giustiniani, a noble Genoese, long maintained an obstinate resistance. On the morning of May 29 the Turks made a combined attack by land and sea without success; but the retirement from the ramparts of Giustiniani, who had been severely wounded, caused a panic among his followers, and the simultaneous charge of a chosen body of janizaries, with Mohammed himself at their head, proved irresistible. The brave Emperor, Constantine XI, died in the breach, and the Turks poured in over his corpse to plunder and devastate his capital. Mohammed now transferred the seat of his government to Constantinople, and sought to gain the good will of the inhabitants by promising them a free exercise of their religion. After achieving this great conquest, he made formidable preparations for the invasion of Hungary. Belgrade was the first point of attack; but János Hunyady (q.v.) compelled him to raise the siege (1456). Soon after this Mohammed became master of the Morea, annexed Servia, and conquered the Empire of Trebizond, an offshoot of the Byzantine Empire. He then turned his arms against the Albanians, whose leader, Scanderbeg, long defied the Turkish power. Scanderbeg died in 1468, and 10 years later the subjugation of Albania was completed. In 1470 Mohammed conquered Negropont from the Venetians. In 1475 he made the Khan of the Crimea tributary, and at the same time deprived the Genoese of Kaffa. In 1480, however, he was repulsed by the Knights of St. John from Rhodes. In the same year he captured Otranto in Italy, the last achievement of his reign. Mohammed was possessed of great abilities; he was brave, enterprising, and sagacious; he is said to have spoken five languages fluently, and to have been well versed in geography, ancient history, natural sciences, and the fine arts. But the brilliancy of his career and the occasional generosity and even magnanimity which he showed cannot obliterate the recollection of those acts of cruelty and treachery which have justly branded him as the most ruthless tyrant of the house of Osman.—Mohammed III (1566–1603) was Sultan from 1595 to 1603. He succeeded his father and at once murdered 19 brothers. He waged war against Austria without success.—Mohammed IV (1641–91) was Sultan from 1648 to 1687. He succeeded his father, Ibrahim, who had been murdered by the janizaries. The real rulers were the Kiuprili (q.v.). The reign of Mohammed IV saw the decline of Turkish power in Europe. The great onslaught upon the house of Austria in 1683 resulted in the defeat of Kara Mustapha (q.v.). After other disasters Mohammed was dethroned in 1687.—Mohammed V (1844–1918) was chosen by the National Assembly on April 27, 1909, to succeed his brother Abd-ul-Hamid II (q.v.), whom they had just deposed. Consult Stanley Lane-Poole, *Story of Turkey* (New York, 1889).

MOHAMMED ALI. See Mehemet Ali.

MOHAMMED ALI MIRZA, ä'lē mēr'zà (1872–). A shah of Persia, eldest son of Muzaffar ed Din. He received a liberal education in the English and French languages and married one of his cousins, the daughter of Prince Naïeb Saltaneh, Minister of War. In 1899 he was intrusted with the government of the most important province of Persia, that of Azerbai-

jan. He opposed the constitution and parliamentary government established by his father for the Persian people in 1906. When Muzaffar ed Din died on Jan. 10, 1907, Mohammed Ali succeeded him as Shah. He continually quarreled with the National Council and dissolved that body in 1908. A revolution resulted; the Shah made concessions when it was too late; and on July 15, 1909, the victorious rebels compelled him to take refuge in the Russian Legation. The Council declared this to be an act of abdication and elected his son, Ahmed Mirza (born in 1895), as his successor. Mohammed Ali went into exile in the Crimea, but was granted a pension. See PERSIA, *History*, and consult the corresponding article and section in the NEW INTERNATIONAL YEAR BOOK for 1909.

MOHAM'MEDAN ARCHITECTURE. See ARCHITECTURE.

MOHAMMEDAN ART. The art produced by Mohammedan nations from the seventh century A.D. to the present time; called also MOSLEM ART. The most flourishing period was between the ninth and fourteenth centuries, though in certain places, such as Constantinople, Cairo, Persia, and India, the golden age came later. The homes of this art have been mainly Syria, Persia, Egypt, north Africa, Spain, Asia Minor, India, Sicily, and Constantinople. The Arabs, founders and propagators of Mohammedanism, possessed none of the arts (see ARABIAN ART), and consequently a period of at least two centuries passed before the amalgamation of converted peoples, after tentative efforts to adapt preceding artistic forms, created the special types of Mohammedan art. This work was done especially in Syria, Persia, and Egypt, though north Africa and Spain also contributed their share. Byzantine, Persian, and Coptic artists, even if Christians, were employed at first; but finally all the branches were practiced by Mohammedans. The religious prejudice against the representation of the human figure in art, especially in sculpture, prevented any development in the large fields of figure sculpture and painting, forcing the artist into decorative work in pure line and color, in which he became the most consummate master in the whole history of art. In Persia, it is true, this prejudice was far less strong, and a national school of figure painting was developed in the fifteenth and sixteenth centuries. But the exceptions to the hostility to sculpture, which was especially an idolatrous art in Moslem eyes, are very few. Surface ornamentation became the special domain of Moslem art, whether displayed on broad architectural surfaces or on the smallest article of furniture or decoration. This ornamentation, like the forms of architecture themselves, was at first derived from Byzantine models, as in the earliest Cairo work, with a large added element of stiff floral patterns, mainly of classic origin. But gradually the invasion of purely geometrical forms almost extinguished the flora, and the system was evolved and completed in the eleventh century, which is a combination of pure geometric and arabesque designs, used with ever-increasing profusion until all surfaces were covered with it.

ARCHITECTURE

The origins of Mohammedan architecture must be studied in the mosques (q.v.). As the Mohammedans in the countries which they conquered found themselves surrounded by magnificent monuments of all the past civilizations of the East, it was natural that they should turn to them for the type of their own places of worship. The first important mosque was that erected by the conqueror Omar at Jerusalem in 637—a purely Byzantine design, possibly even a Byzantine church slightly altered. This disappeared centuries ago. The earliest mosque of any pretension now extant was that of Amru (641 A.D.) at Fostat, which consecrated the Arab conquest of Egypt. It served as a type for two centuries. Its colonnades around an open court seem to combine the plan of the atrium of a Christian basilica and the hypostyle hall of an Egyptian temple. The columns were taken from churches and arranged in numerous rows, surmounted by round or pointed arches, on which rested a flat, wooden ceiling. There appear to have been no æsthetic beauty and no decoration in this perfectly plain brick structure. It was in Syria, where the Ommiad caliphs had their capital at Damascus, that the first artistic monuments were erected under Abd al Malak and his son Al Walid (c.700 A.D.). They spent immense sums on three buildings which still remain: the mosque of Damascus (705), reputed the most sumptuous monument of the Mohammedan world and built to surpass the works of Christian architecture in Syria (repeatedly altered and badly injured by fire in 1893); the Al Aksa Mosque and the Dome of the Rock, commonly miscalled mosque of Omar (691), both in Jerusalem, built to rival the church of the Holy Sepulchre. The Al Aksa was of a different type from the Egyptian mosques and more like a hall or a Christian church. The principal side of its court, called the jami, containing the mihrab and pulpit (mimbar), had a forest of 280 columns in 20 rows, and in the centre, in front of the mihrab, rose a dome. On the other hand the great Damascus Mosque was of the Egyptian type of the mosque of Amru, the type of the atrium, and had only a triple line of columns on the jami (main hall) side and a single row on the others. In both mosques the columns now support pointed arches. The courts were filled with secondary monuments, usually in the shape of domed chapels or fountains. The most important of these is the Dome of the Rock in the court of the Al Aksa Mosque. It followed the Byzantine domical type; its central dome, 112 feet high, is supported on four square piers with intermediate columns and is surrounded by two concentric aisles with eight piers and 16 columns on an octagonal plan.

The next important building in the Mohammedan world is the great mosque at Cordova, the capital of the new Kingdom of Spain. It was founded in 786, and its main hall, as it now stands after two enlargements in 876 and 976, is the largest of all mosques, measuring 534 by 387 feet and containing 856 columns in 19 aisles. Its wooden ceiling, notwithstanding this great length, is 30 feet high. The intricate effect of the maze of columns is increased by the lack of any broad and lofty central nave and by the unique arrangement of two stories of superposed horseshoe arches, as well as by the alternation of white and black marbles in the arches. The decoration shows an early form of stiff foliated arabesque in small separate compartments. The eighth century and the following witnessed a flowering of Mohammedan architecture in all provinces and in all classes of buildings: foun-

tains, baths, aqueducts, palaces, khans, bridges, caravanserais, minarets, mausoleums, monasteries and colleges, bazars and city gates, hospitals, cloisters. A large part of the revenues of the state was devoted to public works. Bagdad was built in 762 and became the capital of the caliphate. Great buildings were erected in the cities of north Africa, in Kairwan (mosque in 837), Algiers, Tlemcen, Tunis (mosque and arsenal in 742). The wonderful buildings of Bagdad, no longer extant, probably gave the keynote to the new art. Much of this early architecture and ornament betrays Byzantine origins; but gradually Persian preponderance makes itself felt through the dynasty of the Abbasides, with Bagdad as centre. The wooden roof is entirely abandoned for the dome. A purely Oriental system of ornament is invented, both geometric and arabesque. The wall surfaces, which had hitherto been left plain or ornamented in Byzantine fashion, are covered with intricate stuccoes and faïence tiles, inherited from ancient Persia and Babylonia.

Egypt. Egypt remained for a while outside of this movement, probably because its architecture was still in the hands of native Christian Copts: no domes were used and brick had not yet given place to stone. The earliest mosque in Cairo was that of Amru (642), still extant, but greatly dilapidated, comprising a court, cloisters, and sanctuary. Far more magnificent was that built by Ibn Tulûn when he declared Egypt's independence (876–879). As Ibn Tulûn objected to employing Christian columns for the new mosque, his Christian Coptic architect offered to build it with piers in place of columns. This mosque is of the cloistered type, with two aisles on three sides of the court, or *sahn*, and five aisles in the sanctuary; these are formed of 160 rectangular piers supporting broad, stilted, pointed arches, such as the Copts had always employed. The entire construction was of brick stuccoed, the stucco being decorated with stiff arabesques in relief of the knop and flower pattern derived from ancient Oriental or Egyptian models. A flat wooden roof rested on the walls not far above the crown of the arches. The wall inclosing the mosque forms a court about 300 feet square. All the brilliant revetment and coloring have disappeared. Still this remains the finest example of the early type of mosque. It also has a couple of the earliest minarets, built, as were all the early ones, of brick (twelfth century). There is a small dome in front of the mihrab, as in the earlier Syrian and Palestinian mosques.

Under another dynasty another great mosque was built—the El Azhar or university mosque, in the newly founded capital, Cairo, begun in 969. Here the same cloistered plan was used, but with columns from churches in place of piers. When in 996 the mosque of El Hakim was built, however, the quadrangular pier was used as in the mosque of Tulûn; but its proportions are far slenderer and higher.

It was in the following century that Egyptian architects adopted the dome. Cairo's great characteristic is its multitude of domes. They were used mainly over funerary chapels. There now arose an important class of funerary mosques attached to royal tombs. The Egyptian rulers of the Fatimite dynasty displaced the caliphs of Bagdad as principal patrons of Mohammedan art, and the monuments of Syria, north Africa, and Sicily were inspired from Egypt during the eleventh and twelfth centuries. Undoubtedly it was the thorough study and application of geometry by Arab writers of the schools of Bagdad and Cairo that made possible not only the scientific architecture of this period, but the wonderful system of geometrical ornament that became so much a part of it. A consistent style was finally developed, which spread over the entire Mohammedan world from Spain and Morocco to Persia, and from Asia Minor to India. The minaret towers were multiplied and began to lose their early heaviness (see MINARET) and to take on great variety of forms, and, being built of stone as well as brick, they were better adapted to a richer ornamentation. The heavy walls were crowned with delicate battlements.

Most characteristic was the invention of the stalactite motive in decoration, which was applied to every possible form of corbeling and by means of which a highly ornamental substitute was found for the Byzantine pendentive in effecting the transition from the square plan to the circular or polygonal dome. The historical tendency was ever to raise the domes higher and make them more pointed. Their numbers multiplied in the thirteenth and following centuries. The cemeteries of Cairo are full of ruined but beautiful mediæval domical tombs. The mausoleum mosques of sultans Hasan, Barkuk, Kait Bey, Kalaun, El Ghuri are the finest examples in Cairo of the domical style. Beginning with the tomb of Esh Shafi'y in 1211, passing through the stage of the tomb mosque of Es Salih in 1249, complete success was realized in adapting the dome to the mosque plan under the impetus given by the Mameluke sultans in the mosque of Hasan in 1356, where the plan is a Greek cross centring about an open court and with the domed tomb behind the mihrab. This magnificent building was regarded as unequaled in Mohammedan lands. Its proportions are grandiose; the tunnel vaults over the arms of its cross are bold. Stone and marble have definitely replaced brick. During this time, however, the type of the old cloistered mosque had been continued in buildings not connected with tombs, such as those of Bibars (1268), of En Nasir (1318), Kusun (1329), El Maridany (1339). The system of stalactite corbeling was used to fill up gaps between all different planes. Like most of Mohammedan work, it conceals under apparent irregularity and freedom, not to say vagrant fancy, the most scientific accuracy of form. The wonderful development of decorative work at this time in mosaic faïence, wood carving, marble inlay, metal, etc., is noticed later in this article and in special articles.

Spain. Meanwhile other Mohammedan lands had been following the example of Egypt. The Arabo-Byzantine style of the monuments of Cordova had ruled for about two centuries; a national Mohammedan style was formed shortly before 1000, as in Egypt, as shown in monuments of Tarragona, Segovia, and especially Toledo and later in Granada and Seville. The horseshoe arch, often minutely cusped, was characteristic of this Hispano-Moresque style, together with a peculiar cubical form of capital and, above all, a system of mural decoration in all-over patterns molded or stamped in stucco and enriched with decorative inscriptions and brilliant coloring. The famous Giralda tower at Seville belongs to this middle style, while the alcázars, or Moorish palaces, at Seville (q.v.),

Segovia, and Malaga usher in the style of the Alhambra at Granada. When in 1238 Granada became the capital of the Moors in Spain, its monuments expressed the development of native arts for the ensuing century. Here is found the richest extant combination of the different kinds of surface decoration in which Mohammedan art excelled; arabesque and geometrical ornament, diaper patterns of extraordinary richness, stalactile corbeling, stucco and faïence, mosaic and marble inlay cover every inch of space. But though so rich, the ornament of the Alhambra, being largely cast or stamped, lacks the life and dignity of the freer Egyptian work of the same kind. See ALHAMBRA.

Persia. The Turks and Mongols made such havoc of the earlier monuments of Mohammedan Persia, the region of Bagdad and the great northern states of Bokhara and Samarkand, that nothing has survived in these regions of earlier date than 1300. But the following three centuries, while they show a style no longer in its early prime, produced highly interesting works in Persia and in the derived styles of other countries. The Tatars and Seljuk Turks adapted their work from Persian models, in the buildings of the thirteenth and fourteenth centuries at Sivas, Kaisarieh, Konieh, Nigdeh, Nicæa, Brusa, etc. The contemporary buildings in Persia, at Tabriz, Sultanieh, Teheran, and especially those of the Sefi dynasty at Ispahan (the Meidan, mosque of Mesjid Shah, Bazar, and Medresseh of Hosein Shah), show that Persian architecture was capable of grandiose conceptions finely executed. In Persian ornament, flowing lines were preferred to angular and geometrical designs; even its arabesques are more continuous and soft, and it hardly ever resorted to stalactite corbeling. The bulbous pointed dome is universal, and a vast niche, extending through the whole height of the façade, framed the main portal. The material of construction is brick, faced with enameled tiles of brilliant colors in minute arabesque patterns. A kind of four-centred pointed arch, somewhat like a Tudor arch, is almost universal. The minarets have circular shafts and are very slender, being topped by small domes.

India. At the same time Mohammedan art in India, which made its beginnings in the Kûtûb Minar and mosque and gate of Allah el Din and tomb of Altompsh at Old Delhi, and at Ajmere, in the thirteenth century, received a great impetus through the establishment of the Mogul supremacy (1526), and produced a style that was in many ways the grandest in the whole sphere of Mohammedan architecture. Buildings like the mosque and tomb of Mahmud at Bijapur, the mosques at Fatehpur-Sikri, Agra, and Delhi, the palace of Akbar at Allahabad, and the Taj Mahal at Agra are masterpieces. Red sandstone and marble are the chief building materials; the Taj is largely of alabaster. There is undoubtedly a dependence on the art of Persia in the shape of the pointed arches and domes and in the niche façades, but these Indian architects showed a surpassing sense of composition and effectiveness, never allowing, as the architects of Egypt and Spain so often did, the love of detail to become paramount.

Turkey. Finally, when the Turks captured Constantinople (1453), they adopted the Byzantine system of plan and construction (and specifically that of Hagia Sophia, which became their chief mosque) and superimposed upon this a style of surface decoration which they had developed from Persian models. The architects they employed at first were Christian Greeks, but Sinan, the greatest of them all and a designer of extraordinary genius, was a Moslem. Their mosques have ever since been variations of the type of Hagia Sophia on a smaller scale. But some of them have great merit of dignity and composition and some originality in the exterior treatment, e.g., the mosque of Mohammed II, which has four semidomes grouped around the central one, and especially the Suleimanieh Mosque (1553). These have alternating white and black marbles in the interior voussoirs, and the simple brilliancy of the surfaces gives quite a different effect from a Byzantine interior. The mosques of Ahmet I (1608) and the Yeni Djami (1658), and at Adrianople the noble mosque of Selim, are works of impressive grandeur. The Turkish minaret is of stone, cylindrical, with a tall conical spire and carved galleries. For details regarding special classes of buildings and the delightful domestic architecture of the Moslems, see special articles, such as CARAVANSERAI; FOUNTAIN; BAZAR; TEKIYE; MINARET; MOSQUE.

MINOR ARTS

Decoration. The carving of the Mohammedans was purely decorative, becoming richer as the Middle Ages advanced. In the earlier stages it partook somewhat of Byzantine design, as in the mosque of Cordova and in early Egyptian and Syrian mosques. But it was then scanty and rather heavy. When the schools became more differentiated in the eleventh century, into the Persian naturalistic, figured and floral; the Syrian schematic, animal and floral; and the Egyptian, geometric and stiff floral schools, ornament began to spread over the entire building. Even the exterior surfaces of domes and walls were covered with a lacework cut in stone or stucco. Color was given by marble mosaics in Egypt, or in Syria and Persia by brilliantly colored tiles. The mosque of Omar is an early, the Alhambra at Granada a mediæval, and the mosque of Ispahan a late example. The tiles became an Oriental specialty and were imitated in Spain until recently. In Persia and in Asiatic Turkey the production of these decorative tiles is still an active craft. True sculpture, as distinguished from surface carving, is practically unknown in Moslem art, the Lion Fountain of the Alhambra offering the single notable exception. See AZULEJO.

Woodwork and Ivory. In no style of art has so varied an artistic use been made of wood. Where other styles have used stone and marble we find wood used, e.g., in carved ceilings, windows, pulpits, lecterns, screens, latticework, doors, balconies, parapets, tomb casings. In the richest pieces ivory and mother-of-pearl are sometimes used in connection with wood, being either inlaid in carved panels or being set as panels in wooden frames. Wood was used not only for the furniture of the private house, but for that of the mosque, such as cupboards, tables, and the classes of work mentioned above. Some of the best examples of floral design in Egypt are preserved in wood carvings. The most magnificent pieces are probably the pulpits, such as that of Kait Bey in South Kensington Museum, and the panels from those of Maridany, Lagin, and Kusun in the same museum. The

panels of the hospital of Kalaun show a Persian style of figures and animals rather than the floral and geometrical patterns. The reading platform of the mosque of Kait Bey is a fine instance of marquetry and ivory, largely in polygonal design. Ebony and ivory were often combined in mosaic-like patterns, sometimes framed in strips of metal, as in jewel cases and other boxes. But the most extensive of all the wood carvings and inlaid work were the ceilings of mosques and palaces, as in those of Kait Bey, El Moyyed, and El Bordeini.

Metal Work. The Persians, Syrians, and Egyptians were skillful workers in metal. Perhaps the earliest centre was in Mesopotamia, at Mosul. Brass, bronze, and copper were chiefly used. While chiseled bronze and repoussé copper seem the earliest processes, the works came to be often inlaid with silver and sometimes with gold by different processes: (1) by incrusting a thread of gold or silver into an undercut groove; (2) by inclosing a metal strip or plate between raised walls; (3) by pressing a thin leaf of metal into stipple marks. The entire metal surface was excavated according to the elaborate design, the edges undercut, the threads or plates of gold or silver inserted and burnished, and then the surfaces chased with all the details that could not be given by the general outlines. Animals, birds, human figures, hunting scenes, feasting scenes, and other genre subjects, as well as floral designs, characterize more especially the Persian and Syrian works, while arabesques and geometric patterns predominate in Egypt. Inscriptions are made almost always to contribute to the decorative effect. The Mesopotamian and Persian schools, though undoubtedly of much earlier origin, gained new life in the twelfth century, when Tatar and Turkish influence gave to artists far greater freedom in the use of the human figure. The school of Damascus was the most famous centre at the time of the Crusades, giving its name to the entire process of damaskeening or inlaying. The Egyptian school, with its centre at Cairo, flourished somewhat later, under the Mameluke rulers of the fourteenth century. The objects made wholly of gold and silver have almost entirely disappeared, but the inventories of the palaces of the rulers of Bagdad and Cairo prove the existence of many thousands of such objects—vases, boxes, mirrors, stands, lamps, trays, coffers, figures of birds and animals, dishes, cups, flagons, bowls. Of these classes many objects still remain in the baser metals, either plain or damaskeened; particularly interesting are the hanging lamps, lanterns, and chandeliers, the stands and tables, mosque doors, perfume burners, ewers, boxes (especially writing boxes), trays, and bowls. It is in the magnificent arms and armor that the metal workers showed the supremest mastery, using all the processes—chiseling, damaskeening, enameling, jewel setting—to produce the masterpieces in the shape of poniards, swords, and yataghans, helmets, breastplates, and lances, stirrups, bits, and the rest of the military equipment and caparison, including, in later times, muskets, pistols, and halberds. In this special field the school of Syria (Damascus) reigned supreme, manufacturing the best pieces for the entire Mohammedan world. The Persian style was more ornate, standing midway between Syrian simplicity and Indian gorgeousness. See INDIAN ART.

Glass. It is in Egypt that stained-glass windows were made, rivaling on a small scale the cathedral windows of the Gothic period. Here, as in every other branch, there is originality of methods. The windows are small, forming usually an oblong of less than 2 by 3 or 4 feet. The frame is of wood, and the process consists of pouring a bed of plaster into this frame, letting it set, and then cutting out the design, leaving only narrow rims or bands of plaster to hold the glass. The design is extremely elaborate, with a central motif, usually of flowers, plants, and trees; the bits of stained glass cut to fit over the openings are laid on and fastened with fresh plaster. The openings are often slanting towards the street and the plaster artistically finished on the outside. The effect on the inside is similar to mosaic. The commonest designs are: pinks and other flowers growing from a vase; cypress with entwined flower stem; scroll of flowers and leaves; kiosk between buds or cypresses; one or two cypresses with flowers. Earlier than these are the more purely geometric designs, as in the tomb of Bibars at Cairo. Of course the plaster is far more fragile than lead as a frame, and the windows easily disintegrate and cannot be made large. Such windows (called kamariyeh) are found not merely in mosques, but in the meshrabiyeh or latticed projecting windows of private houses. Such windows, of monumental size and importance, adorn the mosques of Solyman, Ahmet I, the Yeni Djami, and others at Constantinople. In harmony and quiet depth of color they equal or surpass their more colossal Gothic counterparts.

A different kind of artistic glass is exemplified in the mosque lamps of enameled and painted glass. It is true that there is a great quantity of exquisite glass, both white and colored, showing in Persia; Syria and Egypt still carried on in the Middle Ages the old Egyptian and Phœnician industry, with exquisite understanding of forms and tones, furnishing models to Venice; but it is in the mosque lamps that the glassworkers certainly enter the domain of fine art. Here the colors are enameled on a gilt ground and the designs are similar to those of metal work, with greater prominence given to inscriptions; cobalt, red, pale green, and white are the principal enamels, and the decoration is in bands with medallions. The most beautiful examples are works of the fourteenth century from the mosques of Cairo. The mellow light shining through the enamels and glass of these suspended lamps was of an exquisite effect.

Illumination of Manuscripts. The aversion to the representation of the human figure hindered the development of the art of illumination —a branch of art not cultivated extensively until the later Middle Ages. It is true that figured compositions were not unknown either to the Egyptian or the Syrian artists, but it was the Persian school, under Tatar and Mongol influences, which first boldly attempted scenes of daily life and of history. There are many manuscripts of the Koran belonging to the other schools, whose first and last pages are a mass of geometric and floral ornament. The finest collection of Egyptian manuscripts, executed mainly for the sultans of the fourteenth and fifteenth centuries, is that of the Cairo Museum rescued from the mosques, such as those of sultans Kalaun, Shaban, and Barkuk. Sometimes the flowers, arabesques, and polygons are in colors on a gold ground, sometimes in gold on a ground of

plain blue or red or of shaded and grouped colors. The finest of these illuminated pages surpass anything done by Christian artists in richness, in exquisite coloring, and in fineness of execution. They are executed not on vellum, but on fine Egyptian cream-colored or reddish paper. The Syrian and Persian schools avoided the geometric ornamentation, and their floral designs were freer and more naturalistic. The Persian fondness for legend and poetry shows itself in the rich illumination of poems and stories which gave occasion for charming genre scenes and vignettes, and the artist's fancy sprinkled animals and birds in riotous confusion on a background of beautiful garden scenes.

It is in these figured illuminations alone that we can study the style of the fresco painters of Mohammedanism, whose works have disappeared. It is plain from native writers that the caliphs of Bagdad, the rulers of Egypt and Spain, at different times lavishly patronized figure painters and that such works were not confined to the Persian school. It is interesting to note the similarity between Persian and Chinese painted design and to make the Mongols the intermediaries between the two schools. The primitive conception of composition and figure and the awkward conventionalities make the Persian school, though successful in coloring, less successful in its sphere than the purely decorative Egyptian. The most famous Persian illuminators belong to the sixteenth century, such as Fabrizi, Jehangir, Bukhari, and Bahzada. The latter's works are masterly in composition and correspond to the Italian Giottesque masters. The last great master was Mari, a Naturalist from India.

Textile Fabrics. The Far East had always been famous for its artistic stuffs, embroideries, tapestries, rugs. It was as successors to the arts of Persia and Babylon that the Mohammedans developed this branch, though Bagdad, Damascus, Cairo, and Cordova all took part and the tribes and villages rivaled with the large cities. Nothing became more characteristic of the East, nothing influenced the West more strongly, through constant importation and the contact of the Crusaders. The haute-lice tapestry, after a method long lost in Europe, was in current use. The same difference finally appeared in the designs here as in other branches: geometrical and set patterns being more common in Egypt; free floral designs being used in Persia. The few known Persian rugs of as early a period as the thirteenth and fourteenth centuries are now valued at many thousand dollars ($10,000 to $40,000), and a study of their design shows an almost incalculable variety of native flowers naturalistically reproduced. The Syrian school had much in common with the Byzantine and, as usual, occupied a middle position, with medallions in a stiff floral ground containing heraldic animals or birds. There were in every Mohammedan country royal manufactories whose products were entirely reserved for the court and sovereign; the standards, baldachins, tents, royal robes, hangings, housings, and rugs were all of a magnificence unknown to the ruder West and unsurpassed at any time. The known specimens date no earlier than the eleventh century, and the art decayed before the sixteenth century.

Influence on Europe. Sicily, southern Italy, Venice, and Spain were affected by the Mohammedan arts during the Middle Ages and even as late as the Renaissance. Hence the use of the pointed and the horseshoe arch in many parts of southern Europe. The cosmopolitan culture of the Norman kings of Sicily had a large Mohammedan element. The palaces of the kings—such as La Kuba, La Ziza, Favara, and Baida—were imitated from those of the Eastern emirs and sultans; San Giovanni degli Eremiti seems an importation from Cairo. Mohammedan artists executed the wonderful stalactite ceiling in carved wood and probably also the geometric mosaics in the Cappella Palatina at Palermo. The famous Ruffolo Palace at Ravello and several cloisters (e.g., at Amalfi) show the spread of Eastern architectural forms in Campania. It is interesting to see how in most cases where there are traces of Byzantine art there are also signs of Mohammedan influence, and vice versa. This is nowhere more evident than in Venice, where both forms of Oriental art were so prominent. Here quite a flourishing school of Mohammedan metal workers was established, existing as late as the sixteenth century, when Mahmud El Kurdi signed some exquisite pieces. The Italian artists who imitated them called themselves workers *all' agemina*, 'in the Persian style,' and even Cellini confesses to have copied Oriental arms. In fact, the Renaissance metal workers of the sixteenth century both in Italy and France owed more than their mediæval predecessors to Oriental design; and there are traces of a like influence in German ironwork and niellos of the sixteenth century, especially that of Nuremberg. Even more widespread and radical was the use and imitation in Europe of Oriental stuffs and fabrics, partly Byzantine, but especially Mohammedan—wonderful not merely for beauty of material, but for the figures and patterns woven or embroidered. The imported tents, baldachins, hangings, carpets, and the like furnished the models for the European ateliers in Sicily, Rome, Venice, Belgium, and France.

Bibliography. G. Le Bon, *La civilisation des Arabes* (Paris, 1883), contains the most suggestive general sketch of the Mohammedan arts, with numerous illustrations; Gayet, in *L'Art arabe* (ib., 1893) and in *L'Art persan* (ib., 1895), describes the various arts in Mohammedan Persia and Egypt in handbook form. A more thorough book of the same type is Stanley Lane-Poole, *The Art of the Saracens in Egypt* (London, 1886). Franz-Pascha, *Die Baukunst des Islam* (Darmstadt, 1896), is a general historical and critical treatise on Mohammedan architecture and decorative details, with description of the different classes of buildings. For the designs and patterns used in decoration, the best textbooks are those of J. Bourgoin, *Les arts arabes* (Paris, 1868–70) and *Précis de l'art arabe* (ib., 1889). In James Fergusson, *History of Architecture* (new ed., New York, 1907), considerable space, with not very scientific treatment, is given to the Mohammedan styles; see also his *Indian and Eastern Architecture* (London, 1876); M. von Berchem, in his "Notes d'archéologie arabe" (in various years of the *Journal Asiatique*), is laying a good historic basis for an historic treatment and making known new monuments. The most sumptuous illustrative plates are still, for Egypt, in A. C. T. E. Prisse d'Avennes, *L'Art arabe d'après les monuments du Caire* (Paris, 1869–77), and, for Persia, Flandin and Coste, *Monuments modernes de la Perse* (ib., 1867). For Spain the

first serious work was Girault de Prangey, *L'Architecture des Arabes et des Maures en Espagne, en Sicile et en Barbarie* (ib., 1842), which should be supplemented by the Spanish government publication, *Monumentos arquitectonicos de España* (Madrid, 1877 et seq.); also A. F. Calvert, *Moorish Remains in Spain* (2 vols., London, 1905–07). The sumptuous *Jeypore Portfolio of Architectural Details* edited by S. S. Jacob (7 vols., London, 1890–94) illustrates Moslem decorative art in one province of India. The architecture of Turkey is treated with some fullness in two works: Montani, *Architecture ottomane* (Constantinople, 1873), and Parvillée, *Architecture et décoration turques* (Paris, 1874). By far the best general treatise on Mohammedan art is that of Saladin and Migeon, *Manuel d'art mussulman* (2 vols., Paris, 1907). Nothing satisfactory has been published about the monuments of northern Africa, of Syria, or Asia Minor. Aside from the works remaining in situ there are not many collections of the smaller works of Mohammedan art. That of the South Kensington Museum is important, as are those of Cairo, of Constantinople, and of the Musée des Arts Decoratifs in Paris. See cuts in articles Arabesque and Arabian Art.

MOHAM'MEDANISM. The name commonly given in the West to the religion founded by Mohammed. The proper name is Islam (q.v.), suggested by Mohammed himself, which meant 'resignation,' or acceptance of the divine will, and was explained by the prophet to include the performance of five duties (the "five cardinal points of Islam"), viz.: acceptance of the formula, "there is no god but Allah, and Mohammed is his prophet"; prayer; almsgiving; the fast of Ramadan; and the pilgrimage to Mecca.

Doctrine and Practice. Like every organized religion, Islam, as developed by the Mohammedan theologians, presents two sides—the theoretical part, known as *'īmān* (faith), and the practical part called *dīn* (religion). The doctrine concerning *God*, His nature and attributes, coincides with the Jewish and Christian in so far as He is by both taught to be the Creator of all things in heaven and earth, who rules and preserves all things, without beginning, omnipotent, omniscient, omnipresent, and full of mercy. But, according to the Mohammedan belief, He has no offspring. Jesus is regarded, like Adam, Abraham, and Moses, as a prophet and apostle, although his birth is said to have been due to a divine intervention; as the Koran superseded the Gospel, so Mohammed superseded Jesus and all preceding prophets. Next to the belief in God that in *angels* forms a prominent dogma, and, like the former, may be traced back directly to Jewish and Christian and in a smaller degree to Persian influences. Created of fire and endowed with a kind of incorporeal body, angels stand between God and man. There are four chief angels: Gabriel, the angel of revelation; Michael, the special protector and guardian of the Jews; Azrael, the angel of death; Israfil (Uriel), whose office it will be to sound the trumpet at the resurrection. Besides angels there are good and evil genii (see Jinn), of a grosser fabric than the former and subject to death. They have different names and offices (*pīrīs*, fairies; *deves*, giants; *takwīns*, fates; etc.), and are much like the *shēdīm* in the Talmud and Midrash and the demons of other peoples. The chief of the evil genii is Iblis (q.v.), once called Azazil, who, refusing to pay homage to Adam, was rejected by God. A third belief is that in certain divinely given *scriptures*, revealed successively to the different *prophets*. Originally there were 104 sacred books, but only four have survived, viz.: the Pentateuch, the Psalms, the Gospel, and the Koran, and the first three are in a mutilated and falsified condition. The number of prophets sent at different times is stated variously at between 200,000 and 300,000. Among them 313 were apostles and six were specially commissioned to proclaim new laws and dispensations, which abrogated the preceding ones. These were Adam, Noah, Abraham, Moses, Jesus, and Mohammed—the last the greatest of them all, and the propagator of the final dispensation. The belief in the *resurrection* and the *final judgment* is an important article of faith, which in the theological writings later than Mohammed is elaborately developed. The condition of the dead in the future world and the punishment of the wicked are pictured with a great multiplicity of details. The dead are received in their graves by an angel announcing the coming of the two examiners, Munkar (unknown) and Nakir (repudiating), who, described as two black angels with blue eyes, put questions to the dead respecting his belief in God and Mohammed and, in accordance with the answers, either torture or comfort him. The soul, awaiting a general resurrection, is treated according to its rank; prophets enter immediately into Paradise; martyrs, in the shape of a green bird, partake of the delights of the abode of bliss; common believers either stay near the grave, or are with Adam in the lowest heaven, or remain in the well Zemzem or in the trumpet of the resurrection, or rest in the shape of a white bird under the throne of God. The souls of infidels dwell in a certain well in the province of Hadramaut (interpreted as chamber of death), or, being first offered to heaven, then to earth, and rejected by both, are subject to unspeakable tortures until the day of resurrection. Concerning the latter considerable discrepancy reigns among the Mohammedan theologians. Mohammed himself seems to have held that both soul and body will be raised, and it is said that the rump bone will remain uncorrupted till the last day, and from it the whole body will spring anew after a forty days' rain. Among the signs by which the approach of the last day may be known are the decay of faith among men, the advancing of the meanest persons to the highest dignities, wars, seditions, and tumults, and consequent dire distress. Certain provinces shall revolt, and the buildings of Medina shall reach to Mecca. These are the eight "lesser" signs; of "greater" signs there are no less than 17; the sun will rise in the west, the Beast will appear, Constantinople will be taken by the descendants of Isaac, the Antichrist will come and be killed by Jesus at Lud (Lydda). Further, there will come a war with the Jews, Gog and Magog's (*Yājūj* and *Mājūj*) eruption, a great smoke, an eclipse, the Mohammedans will return to idolatry, a great treasure will be found in the Euphrates, the Kaaba will be destroyed by the Ethiopians, beasts and inanimate things will speak, and finally, a wind will sweep away the souls of those who have faith, even if equal only to a grain of mustard seed, so that the world shall be left in ignorance. The time of the resurrection even Mohammed could not learn

from Gabriel; it is a mystery. Three blasts will announce it—that of consternation, of such terrible power that mothers will neglect the babes on their breasts and heaven and earth will melt; that of examination, which will annihilate all things and beings, even the angel of death, save Paradise and hell and their inhabitants; and, 40 years later, that of resurrection, when all men, Mohammed first, will have their souls breathed into their restored bodies and will sleep in their sepulchres until the final doom has been passed upon them. The day of judgment, lasting from 1000 to 50,000 years, will call up angels, genii, men, and animals. The trial over, the righteous will enter Paradise, to the right hand, and the wicked will pass to the left, into hell; both, however, have first to go over the bridge *Al Sirāt*, laid over the midst of hell, finer than a hair, sharper than the edge of a sword, and beset with thorns on either side. The righteous will proceed on their path with ease and swiftness, but the wicked will fall headlong. *Hell* is divided into seven stories or apartments, respectively assigned to Mohammedans, Jews, Christians, Sabians, Magians, idolaters, and—the lowest of all—to the hypocrites, who, outwardly professing a religion, in reality had none. The degrees of pain—chiefly consisting in intense heat and cold—vary; but the Mohammedans and all those who professed the unity of God will finally be released, while unbelievers and idolaters will be condemned to eternal punishment. *Paradise* is divided from hell by a partition (*'urf*) in which a certain number of half saints will find place. The blessed, destined for the abode of eternal delight (*Al Jannah*, Heb. *Gan-Eden*), will first drink of the pond of the Prophet, which is supplied from the rivers of Paradise, whiter than milk and more odoriferous than musk. Arrived at one of the eight gates, they will be met by beautiful youths and angels; and their degree of righteousness (prophets, religious teachers, martyrs, believers) will procure for them the corresponding degree of happiness. Mankind on the last day will be assembled in three classes: (1) those who go on foot, believers whose good works have been few; (2) those who ride, believers acceptable in the eyes of God; and (3) those who creep, the unbelievers. The various felicities which await the pious represent a conglomeration of Jewish, Christian, Zoroastrian, and other fancies to which the Prophet's own sensual imagination has added very considerably. Feasting in the most gorgeous and delicious variety, the most costly and brilliant garments, odors, and music of the most ravishing nature, and, above all, the enjoyment of the *Hur al 'uyūn*, the black-eyed daughters of Paradise (see HOURI), created of pure musk, are held out as a reward to the commonest inhabitant of Paradise, who will always remain in the full vigor of youth and manhood. For those deserving a higher degree of recompense rewards will be prepared of a purely spiritual kind—i.e., the "beholding of God's face" (Shekinah) by night and by day. The last of the precepts of pure faith taught by Mohammedanism is the full and unconditional *submission* to God's decree, and the *predestination* of good and evil, which is found from the beginning inscribed on a "preserved table." Not only a man's fortunes, but his deeds, and consequently his future reward or punishment, are irrevocably, and thus unavoidably, preordained—a doctrine which is not, however, taken literally by all Moslems.

The first of the four chief duties of *dīn*, or the practical part of Islam, is *prayer*, "the key of Paradise." Certain religious purifications are included as necessary preparations. They are of two kinds: the *ghusl*, or total immersion of the body, required on certain special occasions, and the *wudū'*, a partial ablution, to be performed immediately before the prayer. This is of primary importance, and consists in washing the hands, face, ears, and feet up to the ankles—a proceeding generally accompanied at each stage by corresponding pious sentences, and concluded by the recital of the ninety-seventh sura of the Koran. If water is not to be had, sand may supply its place. Even the ground or the carpet upon which one prays must be as clean as possible, and the use of a special prayer carpet (*sajjādah*) is therefore recommended. Every Mohammedan is required to pray five times in the space of 24 hours. The prayer (*salāt*) itself consists partly of extracts from the Koran (*farḍ*), partly of sentences ordained upon the precept or practice of the Prophet (*sunna*). The times of prayer are: daybreak (*fajr*); noon (*zuhr*); afternoon, midway between the second and fourth (*'asr*); evening (*maghrib*); after night has closed in (*'ishā*). These several times of prayer are announced by the muezzins (q.v.) from the minarets of the mosques. The believer passes through a series of 13 postures during his prayers; and a certain number of such inclinations of head and knees, prostrations, etc., is called *rak'ah*. It is necessary that the face of the worshiper should be turned towards the kiblah, i.e., in the direction of Mecca (see KIBLAH). Women, although not forbidden to enter the mosque, yet are not supposed to pray there, lest their presence should be hurtful to true devotion. Besides these prayers there are others ordained for special occasions, as on a pilgrimage, before a battle, at funerals, during an eclipse, etc. The Moslems do not pray to Mohammed, but simply implore his intercession, as they do that of the numerous saints, the relatives of the Prophet, and the first propagators of Islam. Petitions, moreover, play a subsidiary part in the prayers, which are chiefly made up of thanksgivings and praise formulas. Mohammedanism has no clergy in the Western sense of the word, but there is always a leader (*'imām*), who takes his stand at the head of the congregation and "leads" the latter in prayer. (See IMAM; MOLLAH; MUFTI.) Next to prayer stands the duty of giving *alms*. These are twofold, legal (*zakāt*) and voluntary (*ṣadaḳah*), but the former, originally collected by the sovereign and applied to pious uses, has now been practically abrogated. The sadakah, according to the law, is to be given once every year, of cattle, money, corn, fruits, and wares sold, at about the rate of from 2½ up to 20 per cent. Besides these, it is usual to bestow a measure of provisions upon the poor at the end of the sacred month of Ramadan. The duty of *fasting* follows. During the whole month of Ramadan the Moslem is commanded to refrain from eating, drinking, and every indulgence in worldly pleasure, from daybreak until sunset. During the night he is allowed to eat, drink, and enjoy himself. Certain classes are exempt, as it was Mohammed's special and express desire that no one should fast who is not equal to it, lest he injure his health and disqualify himself

for necessary labor. Of other commendable fast days, the most important is the *'Ashūrā*, on the tenth of Muharram, corresponding in a measure to the Jewish Day of Atonement. The fast of Ramadan is universally kept, in letter if not in spirit, fasting being considered "one-fourth part of the faith." (See FAST; RAMADAN.) The last duty is the *pilgrimage* to Mecca, which every Moslem must make once in his life, if he be free, sound in body, and able to meet the expense. Women also perform the pilgrimage. To pay the way of one who cannot himself afford it is considered a pious act, and the Shiites allow the pilgrimage to be made by proxy. See HAJJ; HAJJI.

To the "positive" ordinances of Islam may be added the *saghīr* or *lesser* and *kabīr* or *greater festivals*. The first (*al fitr*, or breaking the fast) follows immediately upon Ramadan, beginning on the first day of the month of Shawwal, and lasts three days. The second (*'īd al kurbān*, or sacrifice festival, also called *'īd al duha* in India, *'id al Bairam* in Turkey and Egypt) begins on the tenth of Dhu'l hijjah. The latter was intended to be the more important of the two, but the people have in most places changed the order, and make the lesser festival, which follows Ramadan, the more joyful and the longer. The day set aside for the weekly assembly is Friday, which, however, is not a day of rest.

Islam also enjoins a number of *prohibitory laws* based upon utterances of the Prophet. The drinking of *wine*, which includes all strong and inebriating liquors, is rigorously forbidden. Chiefly through European influence some Moslems have lost their scruples on this score, but the great majority of the faithful refuse even to make use of the proceeds of the sale of wine or grapes. Some scrupulous believers even include opium, coffee, and tobacco in the prohibition; but general practice has decided differently. The prohibitory laws respecting *food* resemble closely those of Rabbinical Judaism; blood, the flesh of swine, animals which have died from disease or age, or on which the name of some idol has been invoked, or which have been sacrificed unto an idol, or which have been strangled, or killed by a blow, a fall or by some other beast, are strictly forbidden. "Pure" animals must be slaughtered according to certain fixed rules, and fish, bird, game, are generally allowed for food. All *games* subject to chance—such as dice, cards, tables, bets, etc.—are considered so wicked that a gambler's testimony is invalid in a court of law. Chess and other games depending on skill—provided they do not interfere with the regular performance of religious duties, and that they are played without any stakes—are allowed by the majority of Moslem theologians. *Usury* is strictly prohibited. Taking interest upon any loans, however large or small, or profiting in trade through questionable means, save by buying and selling, is severely condemned. To prevent the faithful from ever falling back into idolatry, the laws relating to *images and pictures* have been made very stringent. Whosoever makes an imitation of any living being in stone, wood, or any other material, shall, on the day of judgment, be asked to endow his creation with life and soul, and, on his protesting his inability to do so, shall undergo the punishment of hell for a certain period.

The *civil* and *criminal laws* of Mohammedanism, founded on both the Koran and the Traditions (*Sunna*, q.v.), in instances where the letter of the written or oral precept allows of various explanations, or where the case in question is unprecedented, are interpreted according to the opinion of one of the four great masters of Islam: Abu Hanifah (born 702), Malik ibn Anas (born 714), Mohammed al Shafii (born 767), and Ahmad ibn Hanbal (born 780), within the pale of their respective sects. (See MOHAMMEDAN SECTS.) Upon the principal points all Mohammedans agree. In regard to *marriage*, polygamy is allowed, but not without restriction. Four wives, though he may cohabit with any number of concubine slaves, is the legal limit for a Moslem. The Prophet's example proves nothing to the contrary, since he was endowed with special privileges and was not in all respects subject to the common law. It is, moreover, added as advice that to marry one or two is quite sufficient for a man. As a matter of fact, the rule among Mohammedans of the present day is to have but one wife. A Moslem may marry a Christian woman or a Jewess, but a Mohammedan woman is not, under any circumstances, to marry an unbeliever. In all cases, however, the child born of a Moslem, whatever the mother's faith, is a Moslem; nor does the wife who is an unbeliever inherit at her husband's death. Forbidden degrees are: the mother, daughter, sister, half sister, aunt, niece, foster mother, or a woman related to the faithful "by milk in any of the degrees which would preclude his marriage with her if she were similarly related to him by consanguinity"; the mother of his wife, even if he be not yet actually married to the latter; the daughter of his wife, if the latter still be his legal wife; his father's wife and his son's wife; two sisters at the same time; wives who stand to each other in the relation of aunt and niece; or the unemancipated slave, or another man's slave, if he have already a free wife. A simple declaration of a man and woman at the age of puberty, before two witnesses, of their intention to marry each other, and the payment of part of the dowry (which is indispensable, and must amount to at least 10 dirhems, or about $1) is sufficient for a legal marriage. A girl under age is given away by her natural or appointed guardian, with or without her consent. To see the face of any woman who is neither his wife nor his concubine, nor belongs to any of the forbidden degrees, is strictly forbidden to the believer. *Divorce* is a comparatively light matter with the Mohammedans. Twice a man may send away his wife and take her back again without any ceremony; the third time, however, he may not receive her again in wedlock unless she have been married properly to another man in the meantime. Mere dislike is sufficient reason for a man to dissolve the conjugal ties, and his saying "Thou art divorced," or "I divorce thee," together with the repayment of the dowry, is all that is required from him by the law. A wife, on the other hand, is bound to her husband forever, unless she can prove some flagrant ill usage or neglect of conjugal duty on his part; and even then she forfeits part, or the whole, of her dowry. A divorced woman is obliged to wait, like the widow, for a certain period before marrying again. If she have a young child, she is to suckle it until it be two years old, and the father is to bear all the expenses of the maintenance of mother and child. If a

slave becomes a mother by her master, and he acknowledges the child to be his own, the latter is free, the mother becomes the wife of her master, and may not be given away or otherwise disposed of by him during his lifetime. A free person, wishing to marry his or her slave, must first emancipate this slave; and if the slave of another person has been married by a free man or woman, and afterward becomes the latter's property, the marriage becomes illegal, and can only be renewed by a legal contract and emancipation. As regards *inheritance*, males generally receive a double share. A person may not bequeath more than one-third of his property, unless there be no legal heirs. Children, whether begotten with the legal wife, or slave, or concubine, or only adopted, and their descendants, are the first heirs; next come the claims of wives, parents, brothers, sisters, in their order. Where there is no legal heir the property falls to the state. The law is very lenient towards *debtors*. Insolvency and inability to work for the discharge of the claim absolve from all further obligations. The most conscientious performance of all private contracts is constantly recommended in the Koran. *Murder* is either punished with death or by the payment of a fine to the family of the deceased, according to their own pleasure. There must, however, be palliating circumstances in the latter case. The Bedouins still maintain the primitive Semitic law of blood revenge, and up to this day the "vendetta" often rages not only between family and family, but between whole tribes, villages, and provinces. Unintentional homicide is expiated by freeing a believer from slavery and paying to the family a certain sum in proportion to the rank and sex of the deceased. He who has not the means of freeing a believer is to fast for two months by way of penance. According to the strict letter of the law a man is not liable to capital punishment for killing his own child or an infidel; but practically no difference is made by the Mohammedan governments (chiefly the Turkish) at the present time. Murder is punished with death and no fine frees the culprit. *Injuries to the person* are punished according to the primitive law of retaliation; i.e., a certain proportionate fine in money is to be paid to the injured. The payment for any of the single limbs of the human body (e.g., the nose) is the full price of blood, as for a homicide; for a limb which is found twice, like hand or foot, half; for a finger or a toe, the tenth part; etc. Women and slaves have smaller claims. Injuries of a dangerous or otherwise grievous nature pay the full price; those of an inferior kind, however, bring the perpetrator within the province of the lash or cudgel. The Koran orders small *theft* to be punished by cutting off the chief offending limb, the right hand; the second theft is punishable by the loss of the left foot; the third, of the left hand; the fourth, of the right foot, etc.; but the ordinary punishments of imprisonment, hard labor, and the bastinado have been substituted in later times. The property stolen must not, however, have been of easy access to the thief, nor must it have consisted of food, since he may have taken this to satisfy the craving of his hunger. *Unchastity* on the part of a woman was in the commencement of Islam punished by imprisonment for life, for which afterward, however, stoning was substituted in the case of a married woman and a hundred stripes and a year's exile in the case of an unmarried free woman, a slave to undergo only half of that punishment. He who accuses a "woman of reputation" of adultery or fornication must produce four (male) witnesses, and if he be not able to do so he is to receive fourscore stripes, nor is his testimony ever after to be received unless he swear four times that he speaks the truth and the fifth time imprecate God's vengeance if he speak false. Even this testimony may be overthrown by the wife's swearing four times that her accuser is a liar, and imprecating the fifth time the wrath of God upon herself if he speak the truth. In the latter case she is free from punishment; the marriage, however, is to be dissolved. Fornication in either sex is, by the law of the Koran, to be visited with a hundred stripes. *Infidelity*, or *apostasy* from Islam, is a crime to be visited by the death of the offender, if he have been warned thrice without recanting. Severer still, i.e., not to be averted by repentance or revocation of any kind, is the punishment inflicted for blasphemy—against God, Mohammed, Jesus, Moses, or any other prophet. Immediate death is the doom of the offender.

A further injunction of the Koran is that of making war against the infidels (*jihād*). He who is slain while fighting in defense of Islam or for its propagation is reckoned a martyr; while a deserter from the holy war is held up as an object of execration and has forfeited his life in this world as well as in the world to come. At first all the enemies taken in battle were ruthlessly slain; later, however, it became the law to give the people of a different faith against whom war was declared the choice of three things—either to embrace Islam, in which case they become Moslems at once, free in their persons and fortunes, and entitled to all the privileges of Moslems; or to submit to pay tribute, in which case they were allowed to continue in their religion if it did not imply gross idolatry or otherwise offend against the moral law; or to decide the quarrel by the fortune of war, in which case the captive women and children were made slaves and the men either slain if they did not become converts at the last moment or otherwise disposed of by the prince. The fifth part of the spoil belongs "to God," i.e., must be devoted to a sanctuary, to the Prophet and his kindred, to the orphans, the poor, and the traveler.

It must not be overlooked that the Islam of history and of the present time is not the pure and unmodified teaching of its founder. The Koran was not intended to be a systematically arranged code of laws. Such laws and regulations as it contains were called forth by some occurrence during the Prophet's life, and were, properly, supplementary to existing laws and customs, which they abrogated, confirmed, or modified according to the occasion. In course of time cases arose for which no written rules could be found laid down by Mohammed. Recourse was then had to traditional oral dicta or to the Sunna (q.v.); in time precedents were established and laws came into force by the concurrence of the learned (*ijmā'*), or by a process of reasoning (*kiyās*). In this way the peculiar system which is called Mohammedan jurisprudence came into being, theoretically founded on the Koran, but often strangely at variance with the principles and spirit of its author. In like manner the reprehensible features of the doctrine and daily life of Islam

must not be charged indiscriminately against Mohammed. That part of the system which most distinctly reveals the mind of its founder, and which also has undergone least change in the course of time and constitutes its most complete and brightest part, is its ethics. Injustice, falsehood, pride, vindictiveness, calumny, mockery, avarice, prodigality, debauchery, mistrust, and suspicion are inveighed against as ungodly and wicked; while benevolence, liberality, modesty, forbearance, patience and endurance, frugality, sincerity, straightforwardness, decency, love of peace and truth, and above all trust in God and submission to His will, are considered as the pillars of true piety and the principal signs of a true believer. Mohammed never expressly laid down that doctrine of absolute predestination and "fatality" which destroys all human will and freedom, and which by the influence of Mohammedan theologians became a fixed element in the orthodox creed. A glance at his system of faith (so far as he had a system), built on hope and fear, rewards and punishments, Paradise and hell, both to be man's portion according to his acts in this life, and the incessant exhortations to virtue and denunciations of vice, are sufficient to prove that aboriginal predestination is not in the Koran, where only submission to Allah's will, hope during misfortune, modesty in prosperity, and entire confidence in the divine plans are supported by the argument that everything is in the hands of the highest Being and that there is no appeal against His absolute decrees. This is but one instance of the way in which Mohammed's dicta have been developed and explained—in such a manner that he has often been made to teach doctrines which he really did not teach; and thus many elements now found in the Moslem creed, if carefully traced back to their original source, will be seen to be the growth of later generations.

In a general estimate of Mohammedanism it should not be forgotten what Islam has done for the cause of humanity and more particularly the share it had in the development of science and art in Europe. Broadly speaking, the Mohammedans may be said to have been the teachers of barbarous Europe from the ninth to the thirteenth century. It is from the days of the Abbasid rulers that the real renaissance of the Greek spirit and Greek culture is to be dated. Classical literature would have been irredeemably lost had it not been for the home it found in the schools of the "unbelievers" of the "dark ages." Arabic philosophy, medicine, natural history, geography, history, grammar, rhetoric, schooled by the old Hellenic masters, and the "golden art of poetry," brought forth an abundant harvest of works, many of which will live and teach as long as there will be generations to be taught. See ARABIC LANGUAGE AND LITERATURE.

History. In the first three years of his mission Mohammed won 40 converts, including his wife, Khadija, Abu Bekr, and Othman. Then followed Ali, Omar ibn Khattab, and Hamza. In 615 the persecutions of the Koreish drove 15 of the converts into Abyssinia, and they were later joined by 100 more. After Mohammed's return from Taif to Mecca he won over some of the Bani Khazraj of Yathrib (Medina), who then made converts among the Bani Aus, formerly their enemies. The new faith spread rapidly from tribe to tribe, the Bani Abd al Ashhal going over in a body. In 622 the number of Mohammedan pilgrims from Yathrib is said to have been 73. After the departure from Mecca Mohammed became the arbiter between the Aus and the Khazraj in Yathrib, and the civil head of the commonwealth. Thus Islam became a political as well as a religious movement.

Mohammed's plans included now nothing less than the conversion of the world to Islam. If he had at first hoped to accomplish this by peaceful measures alone, the aggressiveness of his enemies in advancing against Medina soon forced the preacher to become warrior also, and military success won more and more converts. In 628 Mohammed sent letters to the Byzantine Emperor, Heraclius, to the King of Persia, to the Governor of Yemen, to the Governor of Egypt, and to the King of Abyssinia, inviting them to join the new religion. In the same year he converted part of the Bani Daus of Yemen, and two years later the rest of the tribe followed; in the meanwhile 15 other tribes responded. With the fall of Mecca in 630 A.D., the triumph of Islam in Arabia was assured. Some of the Prophet's bitterest enemies became his most ardent followers; and the next year saw so many embassies suing for alliance that it became known as the "year of the deputations."

After Abu Bekr had brought about the resubjugation of the northern tribes, who had revolted on Mohammed's death, an army was sent into Syria, as the Prophet himself had planned. A second army was sent into Irak. The latter came into contact with the Persian forces, and in Omar's caliphate, by the victory at Kadisiyyah, Chaldæa and Mesopotamia were assured to the Arabs. Christian Bedouins of both sides of the Euphrates became converted at this time, even though tolerance was extended to those who kept their own faith. In Syria almost the only opposition came from Heraclius' armies. The great mass of the people, oppressed by the Byzantines, welcomed the Arabs. By 639 the Greeks had been driven out of the province, most of the large towns having made treaties which guaranteed them toleration of religious belief and protection of life and property on the mere payment of the *jizyah* (poll tax) and *kharaj* (land tax). Friendly relations being thus established, in the following years there was a gradual assimilation of Arabic manners and customs throughout Syria, which made the conversion of the natives easy. Many Christians were converted in the 50 years between Omar and Abd al Malik in Irak, Khorasan, etc. Omar II (717–720) was particularly successful by lightening the burdens of Mohammedan landowners. In addition, the children of women captives were brought up as Moslems; and slaves were allowed to purchase their freedom at the price of conversion. In the tenth century the Nestorian Bishop of Bet Garmai was a noted convert; in 1016 Ignatius, the Jacobite Metropolitan of Takrit (at Bagdad), became Abu Muslim. Converts were won in the following centuries, even from among the Crusaders. Bainaud and his followers embraced Mohammedanism in a body; 3000 Crusaders accepted Islam in Phrygia in 1148 as a result of Mohammedan kindness contrasted with ill treatment on the part of Greek Christians. To-day over 50 per cent of the population of Syria and Palestine is Moslem.

The rapidity with which Mohammedanism spread in Syria and Mesopotamia was not duplicated in the country to the north. In Armenia, even after the Christian power had been overthrown by the Seljuks of the eleventh century, the mass of the population continued Christian. Georgia resisted until the invasion of the Mongols. After the fall of Constantinople (1453) the western and central portions of the country became converted, and after the ruling dynasty of Samtskhé in 1625 had become Mohammedan, progress was rapid among the aristocracy. The eastern portion of the country had submitted to Persia, and hence was naturally subject to Mohammedan influence. In the seventeenth century there were two petty kingdoms in the East the rulers of which, though native princes, were Moslems. Since the beginning of the nineteenth century Georgia has belonged to Russia, but certain parts are still Mohammedan.

After the Mohammedans had succeeded in subduing Syria they turned their attention to Egypt. Amr ibn al Asi drove the Byzantines out between 639 and 641 A.D., and the whole of the country as far south as Abyssinia and as far west as Libya came under Moslem influence. The conquerors, who treated the natives, and especially the Copts, with great favor, were welcomed by them. Many Copts accepted Islam even before the fall of Alexandria; while the number of converts, partly forced, partly willing, up to the caliphate of Omar II (717–720) was large. In the twelfth century Islam was carried, principally by Moslem merchants, into Lower Egypt, and in the fourteenth century into Nubia, the King of Dongola becoming a Moslem in 1340. In Abyssinia conversions were first made in the coast towns in the tenth century, and towards the end of the twelfth a Mohammedan dynasty was founded. In the sixteenth century the Mohammedan Kingdom of Adal, between Abyssinia and the southern end of the Red Sea, came into existence; in the seventeenth one-third of its entire population was Moslem, while in the middle of the nineteenth one-half of the central province of Abyssinia had likewise been converted.

Amr ibn al Asi conquered northern Africa as far as Barca (Cyrenaica). Before the end of the century rapid progress had been made among the Berbers, who made their last resistance at the Spring of Kahina in 703. Musa ibn Nusair and Omar II, the Conqueror, made innumerable converts. In 789 western Africa (Mauretania) became separated from Egypt as a kingdom under Idris, founder of the Idrisite dynasty; in addition to converting many Berbers, he is said to have forced Christians and Jews to apostatize. The Berbers, however, under the Idrisites as under the Aghlabites (a dynasty founded in 800 by Ibrahim ibn Aghlab, hereditary Governor of Ifrikiyyah) were in constant revolt. In the beginning of the tenth century Abu Abd Allah appeared among them as the apostle of the Ismailian sect and succeeded in winning over the whole of the powerful Kitamah tribe to the support of the imamate of Ubaid Allah; and the dynasty of the Fatimites was thus successfully established in Kairawan. Early in the eleventh century the faith spread rapidly among the Berbers of the Sahara also, among whom it had been introduced in the ninth century. The revival was due principally to a chieftain of the Lamtuna tribe, Abd Allah ibn Yasin, who founded a monastery, *ribaṭ*, and won many disciples from various tribes, to which he sent them back as missionaries. In 1042 he led his followers, known as the *Murabituna* (Almoravides), against the neighboring tribes, and by force and persuasion succeeded in establishing a vast empire. Before the end of the century it extended from Senegambia to Algiers; Mohammedan Spain was brought under the sway of the Almoravides. In the beginning of the twelfth century another dynasty was founded among the Berbers, when Abu Abd Allah Muhammad ibn Tumart appeared in the Mauretanian mountains and preached especially against the laxity of morals and the excessive veneration paid to saints. His followers became known as the *Muwaḥḥiduna* (Almohades, or Unitarians). The conquests and conversions of the Almohades were likewise enormous; by 1160 they had an empire extending from Barca to the Atlantic, and embracing Mohammedan Spain. After these events but few of the Berbers remained heathen.

From northern Africa Islam soon penetrated into the interior of the continent. The Almoravides made many converts in the eleventh century among the negroes of the Sudan, who had already become familiar with the new faith through the visits of merchants and missionaries. The negro tribes of the west were first won over; as early as 1010 the King of Surhay (southeast of Timbuktu) became a Moslem; the states on the upper Niger, Timbuktu (founded in 1077) and Melle (west Sudan, founded by the Mandingos), followed and furnished active missionaries as well. The kingdoms of Bornu and Kanem, along Lake Chad, became converted in the eleventh century, the latter kingdom extending as far as Egypt and Nubia. In Darfur a Moslem dynasty was founded in the fourteenth century; at the end of the sixteenth century Wadai and Bagirmi, and in the seventeenth portions of the Hausa country, became Moslem. In the nineteenth century there was a remarkable revival of Mohammedanism due to the influence of the Wahabis. The Fulahs were united into one political organization by Sheik Othman Danfodio, and compelled all the remaining tribes to accept Islam. In French West Africa and French Equatorial Africa Mohammedanism has spread far and wide; and active missionary work has been carried on in Kamerun. The nineteenth-century movement was aided by such religious orders as the Amirghaniyyah, the Tijaniyyah, the Kadriyyah, and the Sanusiyyah. The vast theocracy of the Sanusiyyah has settlements and schools extending from Egypt to Morocco, in the Sudan, Senegambia, Somaliland, the Sahara, and the Galla country; they have gained many converts by education and the purchase of slaves.

Along the west coast of Africa Islam has made steady progress; e.g., on the Guinea coast, in Sierra Leone, in the Ashanti country, Dahomey, the Gold Coast, Lagos (where there are 10,000 Moslems), and Liberia (where there are more Moslems than heathen). Often the common people are converts where the chieftains are not. There is hardly a town along the coast for 2000 miles from the Senegal which has not a mosque.

On the east coast the Emozaydij made settlements before the tenth century; they were Shiites, and were followed by Sunnis, who

founded the town of Magadoxo, and other towns on the coast from Aden to the tropic of Capricorn. Arab traders made Zanzibar Mohammedan. Inland, however, only the Galla and Somali tribes are even partly Moslem. In Cape of Good Hope there have been Moslems since the seventeenth and eighteenth centuries, Islam having been carried there by the Malays. Even among the Hottentots there are converts who make the pilgrimage to Mecca, while in the diamond fields the coolies are said to be missionaries.

Islam was introduced into Spain in 711 by Tarik with 12,000 Berbers. The first converts were from among the ill-treated slaves. The remnant of the heathen population followed, then the nobles and the middle and lower classes of the Christians, so that the majority of the population soon consisted of Mohammedans of non-Arab blood. In 1311 there were 200,000 Mohammedans in Granada alone, only 500 of them being of Arab descent. On the whole, conversion was carried on peacefully except when the Almoravides at the close of the eleventh century came to Spain. The Moslem power began to decline as early as the eleventh century. After the fall of the Almohades, in 1257, it continued chiefly in Granada; the last Moriscos were driven out in 1609.

The Aghlabites made themselves masters of Sicily in 827–878, and under this dynasty and their successors, the Fatimites, a flourishing Moslem civilization existed in the island, the effects of which were still felt after the Norman Conquest (1061–1090) and under the Hohenstaufens (1194–1266).

The Turkish Empire made its first conquests in Europe, at the time of the decline of Islam in Spain. The inception of the Ottoman Empire dates from the beginning of the thirteenth century, when 50,000 Turks settled in the northwest of Asia Minor. In 1353 they entered Europe for the first time and in 1361 made Adrianople their capital. Before the end of the century Bulgaria, Macedonia, Thessaly, and most of Thrace had been subdued by Bajazet; Amurath II (1421–51) added to this territory, and Mohammed II (1451–81), after taking Constantinople in 1453, extended his rule over Greece, Servia, Bosnia, and Albania. A large part of Hungary was added by Suleiman II (1520–66); in the seventeenth century Crete was taken, and Podolia was ceded by the Poles. The most noted example of forced conversion was the enrollment of Christian children in the ranks of the Janizaries (q.v.). Large numbers were converted peaceably from all ranks; in the fifteenth century Adrianople was the home of countless renegades; in the seventeenth converts were made even among the Christian clergy. Progress was very rapid at this time. The power of Servia was broken by the Turks in 1389, but the country was not reduced to the position of a Turkish province until 1459, when the inhabitants chose Mohammedan rule in preference to the Roman Catholicism of Hungary. However, though the nobles became Moslems, only in Old Servia (northeast of Albania) since the seventeenth century has the spread of Islam been rapid. The same period was the date of the rapid conversion of Montenegro; in Bosnia the Bogomiles joined Islam in large numbers after Mohammed II had released over 70 cities from Catholic persecution. The other inhabitants followed gradually, and the Christians left the way clear by emigrating into the neighboring countries. The conversion of the inhabitants of Crete first took place in the ninth and tenth centuries, when the whole population joined Islam; at the beginning of the thirteenth century the Venetians acquired the island, and in 1669, when it was taken from Venice by the Turks, the inhabitants had to be reconverted; within 50 years half of them were again Moslem.

In Persia Islam made progress very early, for under Zoroastrianism the people were oppressed by priest and ruler alike. After the fall of the Sassanid dynasty in the middle of the seventh century converts were easily made, at first mainly from among the despised industrial classes and artisans. Later the Shiites met with great success, for Husain, son of Ali, had married Shahban, daughter of Yezdegerd, the last Sassanid; and in the middle of the eighth century the Ismailians showed a wonderful power of adapting themselves and their teachings to all classes and creeds. At the close of the ninth century Saman, a noble of Balkh, became a Moslem and founded the dynasty of the Samanids (874–999). Conversions were made in the ninth century by Karim ibn Shahriyar, the converted King of the Kabusiyyah dynasty, and by Nasir al Hakk of Dailam; in 912 Hasan ibn Ali, of an Abd dynasty on the Caspian, made many converts in Dailam and Tabaristan.

North of Persia there had been much opposition to Islam, and allegiance to the Caliph was often renounced as soon as the armies were withdrawn. In Samarkand, however, conversions were brought about by Ibn Kutaibah, who burned the heathens' idols. Among the Afghans the King of Kabul was converted about 800; in Transoxiana many converts were made in the eighth century, and by the middle of the ninth Mohammedanism was general. The greatest impetus to the spread of the new faith came about the middle of the tenth century, when some of the Turkish chieftains were converted; in Turkestan the founder of the Ilak Khans converted 2000 families of his tribe, who became known as Turcomans. In 956 the Seljuk Turks had their origin, when Seljuk migrated with his clan to Bokhara from the Kirghiz steppes.

Much of the progress which Islam had made was lost by the Mongol invasion. Bokhara, Samarkand, Balkh, and Bagdad were left in ruins, and almost without inhabitants. Many Mongol rulers, such as Kublai Khan, were energetic in their opposition to Islam. But in the time of Ogdai Khan (1229–41) certain Buddhists were converted; Yisun Timur Khan (1323–28) was an earnest Moslem and made converts of his troops; Baraka Khan (1256–65) turned Moslem with his subjects—the first ruling Mongol prince to take this step in the eastern portion of the Mongol territory. But it was not till 1295 that Islam became the ruling religion of Persia; at that date Ghazan, seventh of the Ilak khans, joined the new faith. In the Middle Kingdom, in the reigns of Tirneashirin Khan (1322–30) and Tughlak Timur Khan (1347–63), Islam became generally adopted, though Burak Khan (1266–70) had also been a Moslem. In the Golden Horde the leaders and aristocracy followed Baraka Khan when he became converted; Uzbeg Khan (1313–40) placed Islam on a solid basis. The Mongols were likewise successful, to some extent, in introducing Mohammedanism into Russia;

e.g., in the Crimea and among the Finns, the Tcheremisses, the Tchuvashes (whole villages of which are Moslem), and the northeast Russian tribes, among whom there are many Mohammedans. In Siberia the first conversions were made in the latter half of the sixteenth century. Since 1745 the Baraba Tatars, between the Irtish and Ob, have been converted. After the proclamation in 1905 of an edict granting religious liberty large numbers of nominal Christians in Asiatic Russia have openly embraced Islam.

In India the first great Mohammedan conqueror was Mohammed Kasim (711), who took Darbul (capital of Sind), Multan, and other cities early in the eighth century. Under Omar II the native princes were called upon to become Mohammedans, and received Arabic names; but many of them later became heathens again. In 1019 Hardat and 10,000 men accepted Islam; but it was some time before the new religion gained a firm footing in India. Down to near the close of the twelfth century Mohammedan India was only a province of Ghazni; at that time Mohammed Ghuri conquered the northern part to the mouth of the Ganges, and his slave Kutb al Din was made Viceroy of Delhi. The latter then proclaimed himself sovereign of Hindustan and founded the dynasty of the "Slave Kings," the first Mohammedan dynasty in India. Mohammed Ghuri likewise converted the Ghakkars, in the mountains north of Punjab. Under the succeeding dynasty, the Khiljis (1295–1320), Mohammedan rule was extended to the Deccan. The Tughlak dynasty which followed was troubled by revolt and desertion, and its power was much reduced; the Sayyids, as well as the Lodis (1451–1526), were rulers over but one province, Bengal, Jaunpur, Malwa, and Gujarat having independent Moslem dynasties. The Mogul Empire was established in 1526 by Baber, and then Islamic influences were more successful. Many rajputs were converted when idolatry was made a bar to advancement at court. In the eastern districts of the Punjab and in Cawnpore many converts were made in the reign of Aurungzebe.

In southern India and in Bengal the spread of Islam was more rapid. The southern coast was subject to the Mohammedan influences of traders; even in the eighth century refugees had come there from Irak, and missionaries in the eleventh. In Malabar the Mappilas, descendants of the early refugees, are estimated at one-fifth of the population. The Laccadive and Maldive islands, as well as Malabar, have an almost exclusively Moslem population. In the Deccan Arabs settled in the tenth century; it had the Mohammedan dynasties of the Bahmanids (1347–1490) and Bijapur (1489–1686). Bengal was the scene of most active propaganda, and Islam was welcomed especially among the lower-caste Brahmins. Lower Bengal has been the scene of a great Mohammedan revival even in the last few years. Kashmir had a Mohammedan king in the fourteenth century; Islam became supreme in the time of Akbar, and today claims over 70 per cent of the population. In Baltistan there has been a Mohammedan population for over three centuries, and the faith is being carried by merchants from Kashmir, as well as from Persia, even into Tibet. In the various parts of India there are about 67,000,000 Moslems, the number of annual converts being estimated at about 600,000. It is worth noticing, however, that in Agra only about one-tenth and in Delhi only about one-fourth of the population is Moslem, and these are prominent centres of Mohammedan power.

Mohammedanism penetrated into China from the south and from the west. Friendly relations were established between the caliphs and the emperors in the time of the Caliph Walid (705–717), when the general Kutaibah ibn Muslim sent ambassadors to the Chinese court. Later Moslem traders entered from Arabia, Bokhara, and Transoxiana. The first mosque was built in 742, in the capital city, Shensi, northern China. In 758, 4000 Arab soldiers were sent by the Caliph Al Mansur to aid the Emperor Sah-Tsung in crushing a rebellion; they remained in China and intermarried with the natives. The annals of the Tang dynasty (618–907) record the arrival of Moslems at Canton; there in the ninth century they lived as a separate community. They were joined later by other arrivals, and intermarried with the natives. Mohammedans entered the Province of Kansu (part of the Empire of Hoey-hu), and the Khan was converted, in the tenth century. The Uigurs, a Turkish tribe transferred to the Great Wall in the Tang dynasty, became Moslems in the ninth century. All of these Moslem communities formed centres for the spread of Islam throughout the Empire. Further accessions of Syrians, Arabs, and Persians followed the great Mongol conquest. Under the Mongol khakans Mohammedans were well treated and rose to positions of trust (in 1244 Abd al Rahman was head of the Imperial finances). At the beginning of the fourteenth century all the inhabitants of Yunnan were Moslems, and in every town throughout the Empire there was a special Moslem quarter. After the expulsion of the Mongols the Mohammedans avoided all external signs of their religion, and assimilated themselves as far as possible to the rest of the population, while keeping the essentials of their religion intact. Missionary efforts were continued quietly and slowly but surely; the only conversion in large numbers took place in 1770, when a revolt was put down in Sungaria and the 10,000 military colonists who were sent there all embraced Islam, and after a famine in 1790 in the Province of Kwangtung, when 10,000 children are said to have been bought and brought up as Moslems. There was a general revival of interest in the eighteenth century, when commercial relations were reëstablished with the outside Mohammedan world. To-day there are about 12,000,000 Mohammedans in the Chinese Republic, of which three-fourths are in the provinces of Kansu and Shensi, in the northwest. As an example of the cities in the east, Peking has 20,000 Moslems, with 13 mosques.

The spread of Islam into the Malay Islands dates from the twelfth century, when more or less successful attempts were made to introduce it into Sumatra; in the fourteenth century the Shereef of Mecca sent missionaries to the island and succeeded in making many converts. In the fifteenth century the great Kingdom of Menang-Kaban had many converts, and the larger part of central Sumatra is now Moslem. On the Malay Peninsula the Kingdom of Malacca was converted in the thirteenth or fourteenth century; the Moslems of the peninsula to-day are said to be most strict in their religious practices, though extremely tolerant.

Converts have been made among the Siamese Buddhists of the north and among the wild tribes of the peninsula. In Java the first notable success of Islam took place in the fourteenth century, and in the following century the new faith was firmly established on the east coast. In the fifteenth century Radan Rahmat, nephew of the Hindu King of Majapahit, made many converts in Ampel and in other places on the east coast; at the same time conversions were made in the west. Radan Patah headed a confederacy which, in 1478, defeated the King of Majapahit, replacing the Hindu with a Moslem dynasty. To-day nearly the whole of Java is Mohammedan. In Celebes general conversion along the coast began in the seventeenth century. The Macassars were the first converts; they then, after much resistance, converted the Bugis, who likewise became propagandists. In the north the Kingdom of Balaang-Mongondou, which was Christian for centuries, was finally converted in 1844. The population of this Kingdom is now half heathen and half Moslem. The island of Sumbawa has had a Moslem population since 1540; Lombok was one of the scenes of conversion by the Bugis.

In the Philippine Islands there has been a long struggle between Christianity and Islam. In Mindanao and the Sulu Islands civilized Mohammedan tribes existed as early as 1521, when the Spaniards came to the islands. Owing to their obnoxious and ill-advised methods, the Spaniards could make no progress in the face of Islam. The Mohammedans, as elsewhere, learned the language of the people, adopted their customs and intermarried with them, thereby winning great success. The independent Kingdom of Mindanao had 360,000 Moslem subjects in the nineteenth century. The Sulu Islands have also been a Mohammedan stronghold. Among the lower classes in the northern islands Islam has not made much headway, as indeed has been the case throughout the archipelago. In New Guinea and the islands to the northwest of it progress has been made only on the coasts. In the archipelago as a whole, however, Islam is spreading. The religious orders, especially the Sanusiyyah, are very active.

It is almost impossible to give reliable figures of the total Mohammedan population of the world. According to a recent estimate (1915), the number may be placed approximately at 220,000,000. This is based in part on the latest available census reports, in part on official and private estimates of varying degrees of probability. The unwillingness of Moslem householders to give an account of the members of their harems interferes everywhere with scientific census taking, and in many lands where Mohammedan missions have been particularly active in recent times no census has ever been taken. The following figures can therefore only claim to be approximately correct. In Asia: Turkey, 15,000,000; Persia, 9,200,000; Afghanistan, 5,000,000; India (1911), 66,623,412; Russia (1911), 13,906,972; China, 12,000,000; Indo-China and Siam, 2,000,000; total in Asia, about 124,000,000; in the East Indies and other islands of the Pacific, about 35,000,000; in Africa: Egypt (1907), 10,336,826; Sudan, 3,000,000; Abyssinia, 5,000,000; Barca and Tripoli, 2,000,000; Tunis, 2,000,000; Algiers, 5,000,000; Morocco, 5,000,000; Liberia, 1,000,000; French West and Equatorial Africa, about 10,000,000; British West, East, Central, and South Africa, about 10,000,000; West and East German, Belgian, and Italian East Africa, about 3,000,000; total in Africa, about 56,000,000; in Europe: Turkey, Bulgaria, Servia, Albania, Greece, Austria, and Russia, about 5,000,000. It is significant that only about 31,000,000, or less than 15 per cent, of this Mohammedan population are found in politically independent Moslem states, viz.: in Turkey, 16,500,000; Persia, 9,200,000; Afghanistan, 5,000,000; while Great Britain has about 95,000,000, Holland about 30,000,000, France about 22,000,000, Russia about 14,000,000, China about 12,000,000, and Abyssinia about 5,000,000 Mohammedans.

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MOHAM'MEDAN SECTS. The movement which led to the division of Islam into opposing parties was at first a political one, though religious, theological, and philosophical questions soon arose which added to the complexity of the situation and caused a further subdivision into sects. Mohammed died without naming his successor; and while Abu Bekr was looked upon by many as the natural leader, others felt that Ali, who was not only the cousin and son-in-law but also a decided favorite of the Prophet, should be his successor. Among the Arabs, however, leadership was not a matter of inheritance but of election; and when Abu Bekr was chosen Caliph he received the recognition of all, including Ali. Omar's election likewise resulted in general satisfaction, although the Ommiads, who, even when they had accepted Islam, were still rivals of the Prophet's family, began to show their opposition to those who had been the Prophet's intimate companions. On Omar's death the caliphate was again denied to Ali, Othman being chosen. Othman's misrule, however, caused great dissatisfaction, and when he was assassinated Ali finally came to the caliphate. The hostility of the Ommiads, however, continued, and soon turned into open revolt, with Moawiyah, the Ommiad Governor of Syria, at its head. The question as to the right of succession, which was soon to cause the permanent separation of the whole Mohammedan world into Shiites and Sunnites, had even then presented itself in great seriousness, the followers of Ali claiming that only the Prophet's family had the right to the caliphate, the Ommiads opposing this claim.

There was also a third party, afterward known as the Kharijites (those who go forth), who held the old Arab view on the question of succession and were thus directly opposed, in principle, to the "legitimists." They were, in reality, in favor of a theocracy; and they claimed that any man might be called to the *imāmah*, or leadership, even if he did not belong to the Koreish, or was not even a freeman, provided only that he was just and pious and fit in every other respect. As a result of this they also claimed that an unrighteous imam might be deposed, or even put to death; and furthermore, that there was no absolute need for any imam at all. Since Ali, however, united in his person the claims of heredity and of election, they were at first among his partisans. But when, at the battle of Siffin, Ali submitted to arbitration the decision of his right to the caliphate as against Moawiyah, they refused to stand by the decision and swear allegiance to either one or the other. Twelve thousand of them consequently deserted Ali's camp in a body; they proclaimed "no rule but that of Allah alone." The Kharijites, though often defeated in this and succeeding caliphates, appeared again and again as the assailants of the established government.

After Ali's death, when Moawiyah had finally succeeded in establishing himself in control, he induced Hasan (q.v.), the elder son of Ali, to yield up his prerogatives. Ali's followers, however, refused to recognize Moawiyah and espoused the cause of Husain, Ali's second son. A bloody struggle followed, in which Husain lost his life. The division of the Mohammedans into Sunnites and Shiites was now fixed, and the Shiites, consistently developing the theory of legitimism, refused to recognize that there had ever been any legitimate caliph between Mohammed and Ali. See SHIITES; SUNNITES.

Despite the fact that with Ali's death and the Ommiad supremacy the question as to the caliphate was settled, the Shiites still looked to the descendants of Ali as their religious leaders, or imams. But even among the Shiites themselves unanimity in regard to the imamate did not long prevail, and discussions of a theological nature likewise proved a source of trouble. The impulse to such discussion came from Persia, into which Mohammedanism had well penetrated, and which, since the principle of hereditary succession had always obtained there, naturally espoused the cause of Ali.

Down to the sixth imam, Ja'far al Sadik (died 765), there was agreement among the Shiites; Ja'far, however, had two sons, Ismail and Musa al Kasim. The former, as the elder, should have been successor to the imamate. The father, however, is said to have declared in favor of Musa; and on Ja'far's death a division ensued between the adherents of Ismail—the Ismailians (*Ismā'iliyyah*)—and those of Musa, the greater part of the Shiites following the latter.

From this time on the question of the imamate received more and more a theological, mystical treatment. The notion of the imam, in general, was that of an ever-living, though at times hidden, supreme guide of the people, who after a time is restored to humanity, or at least to the believing part of it. (See MAHDI.) The Ismailian doctrine was that the imam had been revealed in Ali, whereas during the preceding ages the imams had been concealed; that Ali himself had reappeared in every imam till the time of Ismail, and had then become invisible again; but that he would descend some day "from the clouds" to unite all believers and to restore the pure faith. The real importance, however, of the Ismailians, who existed unobserved for some time, dates from Abd Allah ibn Maimun, whose father had been executed for professing materialistic doctrines and trying to turn people away from the doctrines of Islam. Abd Allah seems to have practically carried out his father's notions. Aided by favorable circumstances, he matured a plan which, for the boldness and genius of conception and for the energy and vigor with which it was carried out, has not many parallels in history. Nothing less was contemplated than the union of the Arabic conquerors and the many races they had subjected since Mohammed's death, and the enthronement of what afterward was called "Pure Reason" as the sole deity to be worshiped. The advanced should be free of all so-called religious fetters,

which, as symbols and allegorical actions, should be laid all the heavier on the necks of the less advanced strata of society. The "believers" and "conquerors" were to be made missionaries for unbelief and the implements for the destruction of their own empire. With an extraordinary knowledge of the human heart and human weakness, he offered devotion to the believer; liberty, if not license, to the "free in spirit"; philosophy to the "strong-minded"; mystic hopes to the fanatics; miracles to the masses. The Messiah whom Abd Allah preached stood higher than Mohammed himself, and, though he did not reject the Koran, he yet contrived to allegorize and symbolize away nearly all its narratives and precepts. An elaborate secret doctrine was worked out, into which the members of the sect were initiated by degrees. Missionary schools were established, and the instruction given to the young missionaries was artfully designed to win over not merely all the different Mohammedan sects, both Sunnites and Shiites, but also Jews and Christians. By the time the neophyte had completed the ninth and concluding degree of initiation all his earlier religious beliefs had been explained away. He had learned that no miracle had ever been performed; that the prophet is merely a man distinguished by his purity and the perfection of his intelligence; and that this purity of his intelligence is precisely what is called prophecy. God throws into the prophet's mind what pleases Him, and that is what is understood by the Word of God. The prophet clothes this Word afterward with flesh and bones and communicates it to the multitudes. He establishes by this means the systems of religious institutions which appear to him the most advantageous for the ruling of men; but these institutions and behests are but temporary and intended for the preservation of order and worldly interests. No man who has knowledge need practice any single one of them; to him his knowledge suffices.

The creed of the Ismailians was gradually built up and many changes were introduced into it at different times; from it sprang various other sects, notably that of the Karmathians. This sect sprang up in the ninth century, under the caliphate of Al Mutamid, and by a combination of extraordinary circumstances succeeded in establishing itself for a time as a political power which threatened to overturn the caliphate itself. The practical exertions of Abd Allah ibn Maimun and their wonderful results had soon attracted the attention of the authorities. Obliged to flee from place to place, he sought refuge successively in Karaj, in Ispahan, in Ahwaz, in Basra, finally in Salamia, in Syria, where he died, leaving his son Ahmad his successor as chief of the Ismailians. One of Ahmad's missionaries (or, according to other accounts, a convert of a missionary) was Al Karmat. He lived in Irak, and was a fit man to carry out the plans of Abd Allah ibn Maimun. His house in Kufa became the centre whence all the missionaries were sent forth and where all the details of a great conspiracy were directed. One of the most noted of the missionaries, Abu Said, won over a great part of the people of Bahrein, the majority of whom were not Mohammedans and were impatient of Moslem rule. In 900 Abu Said defeated an army of 10,000 men sent against him by the Caliph and captured the latter's general. He then gained undisputed possession of the whole country, destroyed the old capital, Hajar, and made Al Hasa, his own residence, the capital. At the same time two other Karmathian chieftains arose to threaten the court of Bagdad, one near Kufa and the other in Syria. The former was defeated, captured, and tortured to death. The latter at first defeated the Governor of Damascus most ignominiously, but in 907 the Caliph's general, Wasif, won a decisive victory and made an end of this branch of the Karmathians. Meanwhile both Al Karmat and Abu Said disappear from view and the leadership passed to Abu Said's son, Abu Tahir. In 923 he seized Basra. The next year he pillaged the Meccan caravan and plundered Kufa. In 927 he gained a decided victory over the Caliph's troops in Irak. In 929 he appeared at Mecca at the head of his army, when the pilgrimage was at its height. Attempts to buy him off were unavailing, and a fearful massacre, lasting several days, ensued. The holy places were desecrated and the Black Stone was carried off. Abu Tahir may have thought that this act would destroy the sanctity of Mecca and the Kaaba in the eyes of the faithful, but if so he was mistaken; the caravans still went on their usual annual pilgrimage as often as he did not restrain them by force. In 939 the emir of the pilgrimage, Abu Tahir's personal friend, persuaded him to conclude a treaty by which the pilgrimage was again allowed, on payment of five dinars for every camel and seven for every horse. The Black Stone was returned for an enormous ransom in 950, seven years after Abu Tahir's death. At that time the Karmathians were masters of Irak, Syria, and Arabia. Little of importance is heard of them again till 990, when they were defeated before Kufa—an event which seems to have made an end of their dominion in Irak and Syria. About 993 they were again defeated by Asfar, and their chief lost his life. They retreated to Al Hasa, where they fortified themselves, while Asfar marched against Al Katif, captured it, and carried away all the baggage, slaves, and animals of the Karmathians of that town and then retired to Basra. The Karmathians retained Al Hasa for a considerable time, but nothing further is heard of them in history. In 1862–63 Palgrave found remnants of them still living in Najran and in Bahrein and Oman, and their hatred of Islam seemed in no wise abated.

Concerning the special beliefs of the Karmathians, so far as they have been preserved, their system seems in the beginning to have been merely a sort of reformed Islam. The prophet Al Karmat, it was held, had brought a new law into the world, by which many of the tenets of Mohammedanism were altered, many ancient ceremonies abrogated, new forms of prayer introduced, and an entirely new kind of fast inculcated. Wine and a few other things prohibited by the Koran were allowed. Certain of the precepts of the book were turned into mere allegories. Instead of tithes they gave the fifth part of their property to the imam. Prayer was merely the symbol of obedience to the imam. Fasting was the symbol of silence, or rather of concealment of religious doctrine from the stranger.

Another offshoot of the Ismailians is the sect known as Assassins (*hashshishin*, a name derived from *hashish*, a drink drawn from hemp, to which the members of the sect were addicted). The sect owed its origin to Hasan ibn Sabbah,

a Persian fanatic, who at the beginning of the eleventh century formed a secret society, the members of which swore blind obedience to their leader, known to history as the "Old Man of the Mountain." From their mountain fastnesses in Persia (Alamut) they bade defiance for two centuries to the strongest armies sent against them by Moslem rulers, and they were reduced to harmlessness only by the Mongol invasion (1255). They owed their power chiefly to the perfection of their secret organization and to the unscrupulousness with which they carried out their plans. They were perhaps best known for the countless assassinations of which the members of the sect were guilty. From Persia they spread into Syria and Asia Minor. While Hasan ibn Sabbah was still alive the Governor of Aleppo had invited them to settle in his territory, and they had taken possession of various mountain fastnesses from which they were enabled to play an important rôle in the Crusades. There are still a few Assassins in the neighborhood of Homs. See ASSASSINS.

When the Assassins came into Syria they found the mountain regions around Hama in possession of the Nosairians, apparently a remnant of the ancient Syro-Phœnician population of the land, which had preserved its own religion through the centuries despite all the efforts of Christianity. Most of the Nosairians displayed a bitter enmity towards the Ismailians, though some embraced their cause, and at the end of the tenth century there was a strong infiltration of Ismailian doctrines into the general Nosairian religious system. In fact, the Nosairian religion, without being identical with Ismailism, shows many strong points of analogy with it. The Nosairians are divided into four sects—*Ḥaidariyyah*, *Ḳalaziyyah* (or *Ḳamariyyah*), *Shamaliyyah* (or *Shamsiyyah*), and *Ghaibiyyah*. The *Shamaliyyah* and *Ḳalaziyyah* are the most important. They all possess the same religious book (*Kitāb al Majmu'*), and differ from one another only on points of minor importance. The chief variations from the Ismailian doctrines are these: while the Ismailians taught that of the seven cycles corresponding to the various manifestations of the deity, the sixth, that of Mohammed, was closed with the death of Ja'far, and the seventh, which was to be characterized by the coming of the Mahdi, or Messiah, was thereby opened, the Nosairians taught that the seventh was closed by the seventh divine manifestation, that of Alī. Furthermore, the Nosairians recognized Musa instead of Ismail as the successor of Ja'far al Sadik. This was probably due to the fact that they had accepted as their leader Mohammed ibn Nosair, who was a partisan of the eleventh imam, a descendant of Musa; and with Musa (died 799), who was the seventh imam, they considered the number of imams to have been completed. Another striking characteristic of the Nosairian belief was their attitude towards the *natiḳs*, the various divine incarnations. The Ismailians held that all the natiks excepting Mohammed were superior to their *assas* (foundations) or *sameṭs*, while the Nosairians placed all of their assas above the natiks. But of greatest importance was the degree to which they carried their doctrine of the divinity of Ali. Ali, while he confided the *word* to Mohammed, had reserved the *ma'na* (meaning) for himself. Ali is their god in heaven and their imam on earth; he is concealed from man because of his divine nature; he is not created and has no attributes; his essence is the light. He created Mohammed to be the veil with which he conceals himself, the place in which he resides, the bearer of his name. Mohammed in his turn created Salman al Farisi to be the *bab*, or gate—the one through whom man communicates with the deity, and who is charged by the divinity with the making of his propaganda. Salman created the five "incomparables" (in reality five planets) which created the world. See NOSAIRIANS.

Besides the Assassins and Nosairians, a third sect with Ismailian tendencies found refuge in the Syrian mountain districts—the Druses. When Abd Allah ibn Maimun found himself persecuted by the authorities he fled to Syria and continued to preach there the coming of the Mahdi. His son Mohammed continued the propaganda, and finally the Mahdi himself appeared among the Berbers of north Africa. This Mahdi founded the dynasty of the Fatimites (909), the sixth of which, Hakim, probably under Ismailian influence, declared himself an incarnation of the deity. He disappeared mysteriously, which helped to support his contentions. Hamza and Al Darzi (whence the name Druse) were his propagandists (*dā'i*), and gained many followers in the Lebanon mountains. It is interesting to note that one of Hamza's treatises was intended as a refutation of the Nosairian doctrines, and tried to show that Hakim, not Ali, was God. See DRUSES.

A sectary whose name has become familiar through the use made of his story by Thomas Moore in his *Lalla Rookh* was Hakim ibn Allah, better known as Al Mokanna (the veiled) because he wore a mask to conceal the disfigurement of his face. He lived in the eighth century and headed a revolt against the Mahdi, the third Abbaside Caliph. He claimed to be an incarnation of the deity and won repute as a miracle worker. He made many followers and for a time maintained himself against the Caliph, but was ultimately defeated and committed suicide. He left word that he would reappear as a gray man riding a gray beast, and his followers long expected his coming. They dressed only in white. See HAKIM IBN ALLAH.

All of these Shiite sects were political, or at least politico-religious, sects, whose doctrines turned about the question of the imamah. But there were in Islam also some sects purely theological, differing on such questions as predestination, free will, belief, idea of God, and revelation—points upon which Mohammed had not expressed himself clearly. It was again in Persia that the movement looking towards independent religious views took its rise, under the influence of Greek philosophy.

The most important of these theological or philosophical sects was perhaps the rationalistic sect of the Mutazilites (*Mu'tazilah*, from *'azala*, to separate). They were called also Muattalites —i.e., those who divest God of His attributes (Ar. *Mu'aṭṭilun*)—and Kadarites—i.e., "those who hold that man has a free will (Ar. *ḳadar*) and deny the strict doctrine of predestination." The first beginnings of this sect are traced to Mabad, who already in the time of Mohammed himself began to question predestination by pointing out how kings carry on unjust wars, kill men, and steal their goods, and all the while pretend to be merely executing God's decrees. The real founder of the sect, as such, however, was Wasil ibn Ata (c.745). He denied God's

"qualities," such as knowledge, power, will, life, as leading to, if not directly implying, polytheism. As to predestination, he held that it existed only with regard to the outward good or evil that befalls man, such as illness or recovery, death or life, while man's actions are entirely in his own hands. God, he said, had given commandments to mankind, and it was not to be supposed that He had at the same time preordained that some should disobey these commandments and that, further, they should be punished for it. Man alone is the agent in his good or evil actions, in his belief or unbelief, obedience or disobedience, and he is rewarded according to his deeds. These doctrines were further developed by Wasil's disciple Abu'l Hudhail al Allaf (died c.845), who did not deny so absolutely God's "qualities," but modified their meaning in the manner of the Greek philosophers, holding that every quality was also God's essence. The attributes are thus not without but within Him, and so far from being a multiplicity they merely designate the various ways of the manifestations of the Godhead. God's will he declared to be a peculiar kind of knowledge, through which God did what He foresaw to be salutary in the end. Man's freedom of action is possible only in this world. In the next all will be according to necessary laws immutably preordained. The righteous will enjoy everlasting bliss, and for the wicked everlasting punishment will be decreed. A dangerous doctrine of this system was the assumption that before the Koran had been revealed man had already come to the conclusion of right and wrong. By his inner intellect, Abu'l Hudhail held, everybody must and does know—even without the aid of the divinely given commandments—whether the thing he is doing be right or wrong, just or unjust, true or false. His belief in the traditions was also by no means an absolute one; indeed, it was held by the Mutazilites that even some of the earliest "traditioners" may have told untruths, or have been imposed upon, and every tradition was to be rejected which was opposed to the Koran, to more authentic traditions, or even to mere reason. As to the Koran, although its authority was recognized, it was held to be created and not an object of worship.

Many were the branches of the Mutazilites. There were, apart from the disciples of Abu'l Hudhail, the *Jubbaians*, who adopted Abu Ali ibn Abd al Wahhab's (Al Jubbaï, died 914) opinion to the effect that the knowledge ascribed to God was not an "attribute"; nor was his knowledge "necessary"; nor did sin prove anything as to the belief or unbelief of him who committed it, who would anyhow be subjected to eternal punishment if he died in it. Besides these, there were the Hashimites, the disciples of Abu Hashim Abd al Salam, son of Al Jubbaï, who held that an infidel was not the creation of God, who could not produce evil. Another branch of the Mutazilites were the disciples of Ahmad ibn Habit (or Haït), who held that Jesus was the eternal word *incarnate*, and that he had assumed a real body; that there were two gods or creators, one eternal—viz., the Most High God—and the other not eternal—viz., Jesus—not unlike the Arian and Socinian theories on this subject; that there is a successive transmigration of the soul from one body into another, and that the last body will enjoy the reward or suffer the punishments due to each soul, and that God will be seen at the resurrection with the eyes of understanding, not of the body.

Four more divisions of this sect are mentioned—viz., the *Jāḥiziyyah*, whose master's (Amr ibn Bahr al Jahiz) notion about the Koran was that it was "a body that might grow into a man, and sometimes into a beast, or to have, as others put it, two faces, one human, the other that of an animal, according to the different interpretations." He further taught that the damned would become fire and thus be attracted by hell; also that the mere belief in God and the Prophet constituted a "faithful one." Of rather different tendencies was Isa al Muzdar, the founder of the branch of the *Muzdariyyah*. He not only held the Koran to be uncreated and eternal, but so far from denying God the power of doing evil, he declared it to be possible for God to be a liar and unjust. Another branch was formed by the *Bishriyyah* (from Bishr ibn al Mutamir), who, while they carried man's free agency rather to excess, yet held that God might doom even an infant to eternal punishment—all the while granting that He would be unjust in so doing. The last of these Mutazilite sectarians to be mentioned are the *Thumamiyyah*, who held, after their master, Thumamah ibn Ashras, that sinners will undergo eternal damnation and punishment; that free actions have no producing author; and that, at the resurrection, all infidels, atheists, Jews, Christians, Magians, and heretics will be returned to dust and will not enter either Paradise or hell. For the scientific development which the doctrines of the Mutazilites begot, and which resulted in the encyclopædic labors called "The Treatises of the Sincere Brethren and True Friends," see SINCERE BRETHREN.

Allied to the Mutazilites in their view of the divine attributes, but diametrically opposed to them in their view of predestination, were the Jabarites (Necessarians). They held that man's every act is the result of the will of God and that there is no human responsibility. There are pure Jabarites and middle Jabarites.

Opposed to both the Mutazilites and the Jabarites were the Sifatites ("Attributists"). With them God's attributes, whether essential or operative, or declarative or historical—i.e., used in historical narration (eyes, face, hand); anthropomorphisms, in fact—were considered eternal. But here again lay the germs for more dissensions and more sects. Some, taking this doctrine of God's attributes in a strictly literal sense, assumed a likeness between God and created things, while others gave it a more allegorical interpretation, without, however, entering into any particulars beyond the reiterated doctrine that God had no companion or similitude. The different sects into which the Sifatites split were, first, the *Asharians*, so called from Abu'l Hasan al Ashari (883–951), who, at first a Mutazilite, disagreed with his masters on the point of God's being bound to do always that which is best. He became the founder of a new school, which held (1) that God's attributes are distinct from His essence, and that any literal understanding of the words that stand for God's members in the Koran is reprehensible; (2) that predestination must be taken in its most literal meaning—i.e., that God preordains everything. The opinions on this point of man's free will are, however, much divided, as, indeed, to combine a predestination which ordains every act

with man's free choice is not easy. The middle path, adopted by the greater number of the doctors, is expressed in this formula: there is neither compulsion nor free liberty, but the way lies between the two, the power and will being both created by God, while the merit or guilt is imputed to man. Regarding mortal sin, it was held by this sect that if a believer die guilty of it without repentance, he will not, for all that, always remain a denizen of hell. God will either pardon him or the Prophet will intercede in his behalf. Further, he in whose heart there is faith of but the weight of an ant shall be delivered from hell fire. From this more philosophical opinion, however, departed a number of other Sifatian sects, who, taking the Koranic words more literally, transformed God's attributes into grossly corporeal things; the *Mushabbihites*, or Assimilators, conceived God to be a figure having limbs like those of created beings, either of a bodily or a spiritual nature, capable of locomotion, ascent, or descent, etc.

The *Murjites*, likewise regarded as a sect of the Sifatites, are sometimes regarded as the representatives of the whole sect, for their doctrines were very widespread, and they counted among them such men as Said ibn Jubair. The sect arose in Syria or north Arabia. It is worthy of note that some of the Murjites hold views approaching closely not only to those of the Mutazilites and Jabarians, but even, with reference to the imam, to those of the Kharijites.

Aside from the sects which owed their rise to political or theological differences, there were others in Islam which sprang from mysticism and asceticism. It is true that the secluded life of the monastery or hermitage was forbidden to Mohammedans by the Koran; nevertheless as early as the first and second centuries of the Hejira a sect of mystics had come into existence the distinguishing external mark of whom was a garment of coarse wool (*suf*), such as had been worn by the founder of the sect, Abu Said ibn Abu'l Khair (815); they came therefore to be known as Sufis. Their main idea was that to attain to a nearer friendship with God there was necessary a certain course of life which, without demanding entire withdrawal from the world, insisted that religious laws be scrupulously observed and that, God being loved above all else, everything worldly be despised. Merx has shown that this Oriental mysticism goes back finally to Palestine and Neoplatonic philosophy, having come to the Mohammedans through the writings of Syrian philosophers. The main stronghold of the sect, however, was, like that of so many others, in Persia, where Sufiism made many converts from among the heterodox and also gradually altered its original character. At first the Sufi had aimed by ascetic practices and religious contemplation to enter into a state of ecstasy in which he might attain to a real knowledge of the deity; but later Sufiism became in certain regards a real pantheism, and its adherents in the ecstatic state felt themselves united with, and a part of, the Godhead. Sufiism had its organization like other religious orders; the religious meetings were called *dhikrs;* novices (*murid*) were held to regular and exacting duties, as well as to strict compliance with the commands of the sheikh.

A later development (twelfth and thirteenth centuries) of mysticism is represented by the various orders of Dervishes—*Kadiriyyah, Rifaiyyah, Maulawiyyah*, etc.—each with its own garb and symbols, rules of faith and practice as determined by its founder. Their *dhikrs* take place once or oftener every week in their religious houses (*takkiyyah*). There are howling, whirling, and dancing dervishes, and in some orders the members become so insensible to physical sensation while in the state of ecstasy that they swallow glass or glowing coals, and often wound themselves severely in other ways. Most dervishes follow a trade and do not withdraw from the affairs of life. There are also some begging dervishes, who have no dwelling places and live entirely from alms. See DERVISH.

Babism (q.v.) and *Bahaism* may be regarded as the last of the Shiite religious movements in Islam, though the former only outwardly conforms to the religion of Mohammed and the latter has practically developed into a distinct religion rather than a Moslem sect. Mirza Ali Mohammed ibn Radhik was the founder of Babism. He was born at Shiraz, March 26, 1821, proclaimed himself as the *bab al din* (door to the religion), June 11, 1844, and was shot to death at Tabriz, July 8, 1850. Ali Mohammed at first appeared only as a reformer of Islam; but as he declared himself to be the mirror in which God is reflected so that every one can see Him, it became evident that he regarded Mohammed not less than Moses and Jesus as superseded. Both in its theology and its social ethics Babism differs from the orthodox schools in Islam. Its pantheism is of such a nature that it clearly connects itself with Sufiism, but many of its practical precepts are at least less obviously related to Moslem mysticism. Ali Mohammed wrote several works, extant in manuscripts, but not yet published in the original Arabic and Persian. Only the Arabic *Bayan* has been translated into French by Nicolas. At Teheran the two half brothers Mirza Yahya Nuri, called Subḥ i Azal (the dawn of eternity), and Mirza Husain Ali Nuri, later known as Baha Allah (the glory of Allah), became converts to Babism. Husain Allah Nuri was born in Mazenderan, Nov. 12, 1817, and was 30 years of age when he became a follower of Bab, whom he never saw. Mirza Yahya had been designated by the Bab as his successor and was recognized as such by the Babis, but in 1867 Husain Ali Nuri claimed to be "he whom Allah shall manifest," and that Bab was only his herald and forerunner. This led to a schism, and since that time there are two sects, the Bahais and the Azalis. The strife between the two parties, in which many were killed, forced the Turkish government to intervene. Subḥ i Azal was sent to Famagusta, Baha Allah to Akka. The former looked upon the revelation in Bab as final, at least for a millennium, and kept in touch with Islam. The latter appealed to all men, not only the Moslems, sought a common ground on which all religions could meet, and emphasized the distinction of his "manifestation" and teaching from Babism. Among his writings are *Ikan*, translated into French by Dreyfus and Habib Allah in 1904; *Kitab i Akdas*, translated into Russian by Tumanski in 1899; and some epistles, translated into English by Browne in 1889. Baha Allah died in 1892, and differences as to the succession immediately arose between his two sons, Abbas Effendi, also called Abdu'l Baha (the servant of the glory), or Ghuzn i A'zam (the most mighty branch), and Mirza Mohammed Ali,

called Ghuzn i Akbar (the most great branch). Abbas Effendi seems to have claimed that the revelation was not ended, while Mohammed Ali and his followers abided by the manifestation in Baha Allah. Thus Bahaism in its turn split up into two rival sects. In recent years that of Mohammed Ali has on the whole decreased, though there have been some notable accessions from the other camp. Abbas Effendi has had a larger following. During the years when he was kept under surveillance in Akka many men and women made pilgrimages to this "holy city" to see "the Master," among them not a few from England and America. The first missionaries of the faith in America were Khairallah, who afterward espoused the cause of Mohammed Ali, and Abu'l Fazl, who was sent over to prevent the schism from spreading. In 1913 Abbas Effendi visited the United States. His *Mufawazat* (outpourings) were translated by Dreyfus into French and by Laura Barney into English in 1908. He also seems to be the author of *The Traveler's Narrative*, translated by Browne. Numerous messages, designated as "tablets," sent to believers, also set forth his ideas on a variety of subjects. Although his works contain no new development of thought, and he has made no further claim for himself than to be "the servant of the glory," the fact that through him Bahaism has become known and has won a number of disciples in England, America, Germany, and France, to whom he is the last of the prophets, the organ of revelation, the final "manifestation," has enhanced his prestige, and probably also affected to some extent the emphasis of his teaching. Religious toleration, search for the essence of truth in different religions, opposition to the *jihad* and war in general, demand for certain social reforms, a more or less pronounced mysticism, and self-effacing devotion to a leader characterize Bahaism and Babism alike. In politics the Persian Bahais seem to have supported the court and favored the interests of Russian and English diplomacy, while the Azalis have espoused the popular cause of the Nationalists.

Such are the numerous sects against which orthodox Mohammedanism has been forced to contend; but, although Shiite doctrines more than once threatened to gain the ascendancy, Sunnism has always remained the victor in the end. The four sects into which the Sunnites are divided—the *Hanbalites, Malikites, Hanifites,* and *Shafi'ites*—differ only in regard to a few points of minor importance connected with religious observances and civil and religious jurisprudence. These sects have remained almost without change since their foundation under the Abbaside dynasty. Nevertheless, certain innovations had crept into the life of orthodox Mohammedans, principally an exaggeration of the reverence paid to the numerous saints, which amounted often to actual worship. It was against such abuses, as well as against all forms of luxury in everyday life, tobacco smoking, etc., that Abd al Wahhab and his followers, the Wahabis, arose in the middle of the eighteenth century. From Nejd they carried on an iconoclastic warfare throughout the country; they conquered Mecca and Medina, and in destroying the many sanctuaries there did not even spare the grave of Mohammed. Previous to this they had taken Kerbela, a holy city of the Shiites in Mesopotamia. They were defeated finally by Egyptian troops, and driven back into the interior of the peninsula. But the Wahabite state, with Riyad for its capital, is still independent and, according to recent accounts of travelers (1915), more powerful than it has been for a long time, while as a sect the Wahabis have spread their influence into Africa and India. See WAHABIS.

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MOHAMMED BEN MOHAMMED BEN YAHAYA, yä'hä-yä, ABUL WEFA, or WAFA (940–998). An Arabic mathematician and astronomer, born at Buzjan and generally known as Abul Wefa. He translated and commented upon works of several Greek mathematicians and calculated a table of sines at intervals of half a degree and also a table of tangents, which, however, was used only for determining

the altitude of the sun. The ratio $\sin \alpha / \cos \alpha$ was called by him the shadow. He is, however, most famous for having made the oldest known attempt to solve geometric problems with only one opening of the compasses. He wrote a book containing 12 chapters on geometrical constructions. Our knowledge of this work is due to a Persian translation of an Arabic manuscript, written by a pupil of Abul Wefa. The problems may be divided into three groups: (1) those dealing with the solution of geometrical problems by one opening of the compasses; (2) to divide a given square into a given number of squares and to construct a square equal to a number of given squares; this is done by juxtaposition and not by the Pythagorean method; (3) problems having for aim the construction of regular polyhedra. In the problem duel between Tartaglia (q.v.), on one hand, and Cardan (q.v.) and Ferrari, on the other, problems of the first group were given for solution and appear in the works of Leonardo da Vinci and Cardan. They also occur in several other works of the sixteenth century, but first found accurate scientific expression in Steiner's *Geometrische Constructionen, etc.* (1883). Consult Volpcke, *Journal Asiatique*, vol. v (5th series, Paris, 1855), and Cantor, *Geschichte der Mathematik*, vol. i (Leipzig, 1900).

MOHAMMED IBN JABIR IBN SINAN. See AL BATTANI.

MOHAMMED IBN MU'SA AL KHUWARIZMI. See AL KHUWARIZMI.

MOHAMMED IBN ZAKARIYA AL RAZI. See RHAZES.

MOHAMMED KUDAH BUNDAH KHAN, kōō'dȧ bōōn'dȧ kän. See MONGOL DYNASTIES.

MOHAMMED'S COFFIN. See MAHOMET'S COFFIN.

MOHAMMED, SIDI. See SIDI MOHAMMED.

MOHAMMERAH, mō-häm'mȧ-rȧ. A town in southwest Persia, Province of Khuzistan, situated on a canal leading from the Karun River to the Shat el Arab, 35 miles from the Persian Gulf (Map: Asia, Central, C 7). The harbor is good, and the town has had an active trade since the opening of the Karun to international navigation in 1889. Pop., 15,000.

MOHAUNT. See HIBISCUS.

MOHAVE, mō-hä'vȧ. An interesting tribe of Yuman stock (q.v.), residing along both banks of the lower Colorado River, in Arizona and California. Their popular name, corrupted from *hamok-habi*, signifies "three mountains," in allusion to the three buttes known as the Needles, which they regard as the central point of their ancient territory. They are agricultural, although somewhat nomadic in habit, and in physical type they rank among the finest specimens of the American aborigine. They live in low wikiups of brushwood covered with sand, make pottery and baskets, and cultivate corn, pumpkins, melons, and beans, which, with fish and mesquite beans, give them an abundant subsistence. They practice tattooing and cremate their dead. They have certain hereditary family names and a chiefship hereditary in the male line, but do not seem to have the true clan system. Consult A. L. Kroeber, "Preliminary Sketch of the Mohave Indians," in *American Anthropologist*, vol. iv (N. S., New York, 1902), and P. E. Goddard, "Indians of the Southwest," in American Museum of Natural History, *Handbook Series No. 2* (ib., 1912).

MOHAVE DESERT. A desert region in south California, lying principally in San Bernardino County (Map: California, J 7). It is a part of the Colorado Desert (q.v.), although the two names are often used synonymously.

MO'HAWK (New England Algonquin name, *Maqua, Mahaqua*, Bear; they call themselves *Ganiega-rono*, Bear People, or Flint People). The leading tribe of the Iroquois (q.v.) Confederacy and formerly occupying the lower Mohawk River valley in New York. They were considered the keepers of the eastern door or frontier of the long house of the Confederacy, the Seneca being assigned the duty of guarding the western door. The Mohawk territory was supposed to extend northward to the St. Lawrence, eastward to the country of the Mahican and Wappinger along the Hudson, and southward to the watershed of the Delaware River and the Catskill Mountains, where they bordered upon the Delaware and Munsee. Their geographic position thus brought them into early and intimate contact with the Dutch and English settlers, from whom they procured the firearms which soon made their very name a terror to the remoter tribes. This exposed situation, however, caused them to suffer much more than their confederates in the Colonial wars, so that their seven villages of 1644 were reduced to five in 1677, some whole clans seeming to have been wiped out. See IROQUOIS.

MOHAWK RIVER. The largest affluent of the Hudson. It rises in the sandy hills south of Boonville, Oneida County, and about 40 miles from the east end of Lake Ontario, flows southward until it reaches the city of Rome, then turns eastward, and continues in nearly that direction until it enters the Hudson at Cohoes (Map: New York, F 5). Its total length is about 140 miles, and its drainage area embraces 3470 square miles. Its course lies chiefly in the celebrated Mohawk valley, one of the most beautiful and fertile agricultural regions in the United States. In Colonial times the valley was the main highway to the Great Lakes, and during the Revolution a bitter contest was waged between the American and British forces for its control. There are many thriving manufacturing cities along the Mohawk, which is paralleled by the Erie Canal and by the New York Central and the West Shore railroads, forming a great trade route between the Atlantic seaboard and the West. See NEW YORK.

MOHE'GAN (dialectic form of *Mahican*, from which tribe the Mohegan were originally an offshoot). An Algonquin tribe formerly residing chiefly upon the Thames River in eastern Connecticut and claiming dominion by conquest over several smaller adjoining tribes, not all of which, however, admitted the claim. They seem to have been an eastern extension from the Mahican (q.v.) of the Hudson, while the warlike Pequot (q.v.) were in turn a branch of the Mohegan. At the period of the first settlement of Connecticut the two last-named tribes formed one body under the rule of Sassacus. Uncas, a subordinate chieftain, rebelled against him and assumed a distinct authority as the leader of a small band on the Thames, near the present Norwich. This band became known in history as the Mohegan, while those remaining with Sassacus were distinguished as Pequot. In the struggle between the Pequot and the colonists Uncas aided the English, and in consequence, on the destruction of the Pequot tribe in 1637, the greater part of the survivors were placed

under the dominion of the Mohegan chief, who thus obtained control of the territory of both tribes. He took such care to strengthen his power with the English that after the death of King Philip in 1676 the Mohegan were the only important tribe remaining in southern New England. As the settlements extended they sold most of their lands, retaining only a small reservation on the Thames River in New London Co., Conn., centring about their village, Mohegan. The villages of Groton and Stonington, occupied chiefly by the remnants of the conquered Pequot, were considered also as under Mohegan jurisdiction. They rapidly dwindled when surrounded by the whites, many joining the kindred mission bands at Scaticook and Brotherton in New York. The rest continued to reside at Mohegan, until now they are so mixed with negro and white blood that they have practically lost their identity, although they still retain official State recognition. In 1705 they numbered 750 at Mohegan, reduced to 206 in 1774, 69 in 1809, and 22 in 1910. Consult F. G. Speck, *Notes on the Mohegan and Niantic Indians* (New York, 1909).

MOHILEV, mô-hê-lyĕf'. A government of European Russia consisting of 11 districts and bounded by the Government of Vitebsk on the north, Smolensk on the east, Tchernigov on the southeast and south, and Minsk on the west (Map: Russia, D 4). Area, 18,551 square miles. The northern part of the government is slightly elevated, forming the watershed between the Dnieper and the Düna. The southern and larger part belongs to the region of Poliessie (q.v.) and is low and partly marshy. The government is well watered; the Dnieper and its tributary the Sozh are the chief rivers. Mohilev has a moderate but rather damp climate, and in the low and marshy parts fever is prevalent. Agriculture, which is the principal industry, is carried on by the most primitive methods and famines are not infrequent. The live stock is of a very inferior breed. Gardening is carried on extensively in the vicinity of the towns. The forests, covering more than one-third of the total area, yield turpentine and charcoal and supply the material for the production of wood implements, wagons, etc., which are manufactured on a small scale. In addition there are produced paper, oil, wire nails, flour, glass, matches, etc. The trade is largely in the hands of the Jews. Pop., 1909, 2,164,800; 1913, 2,333,300. Capital, Mohilev (q.v.). In early times the present Province of Mohilev belonged to the Principality of Smolensk. Annexed in the fourteenth century to Lithuania, it afterward became part of the Polish monarchy and was annexed to Russia at the first partition of Poland in 1772.

MOHILEV. The capital of the Government of Mohilev in west Russia, situated on both banks of the Dnieper, 483 miles south of St. Petersburg and 375 miles southwest of Moscow (Map: Russia, D 4). It lies in a picturesque region and has a number of interesting buildings. The Public Park, the Roman Catholic cathedral, in Greek style, whose corner stone was laid in 1780 by Catharine II and the German Emperor Joseph II, the town hall (1679) with an octagonal tower, and the new theatre are among the centres of interest at Mohilev. There are also some interesting monasteries, numerous churches of different denominations, and a museum with noteworthy collections. The educational institutions include two Gymnasia, two theological seminaries, several special schools, a manual-training school, and a public library. Mohilev produces largely leather, linseed oil, flour, and tobacco. A considerable part of its inhabitants are engaged in gardening and fishing. Pop., 1911, 54,058, of whom more than half were Jews.

MOHILEV. The capital of a district of the same name in the Russian Government of Podolia, situated on the Dniester, 89 miles east-southeast of Kamenetz-Podolsk (Map: Russia, C 5). The inhabitants are chiefly engaged in gardening and the transit trade in agricultural products and lumber with Galicia and Odessa. The town has several educational institutions. Pop., 1897, 22,100; 1910, 32,604, over one-half Jewish.

MOHL, mōl, Hugo von (1805–72). A German botanist. He was born in Stuttgart, a brother of Julius and Robert von Mohl, was educated in the classics at the Gymnasium at Stuttgart, and studied medicine at the University of Tübingen (1823–28). After making investigations at Munich (1828–32), he served as professor of physiology in the Academy (1832–34) and University (1834–35) of Bern, and finally was professor of botany at Tübingen (1835–72). There were two distinct periods in his career. During 1827–45 he was mainly concerned with the anatomy of plants, in which he was the leading investigator. During 1845–72 he was concerned chiefly with the development of organs and tissues, and was specially interested in cell formation. His contributions to botanical knowledge fall into three categories. In phytotomy he demonstrated that the cell, as distinguished from fibres, tubes, and intercellular substances, is the sole and fundamental element in plant structure; advanced the theory that secondary thickening of cell walls comes from within; developed with great clearness the idea of the chemical nature of the cell wall; showed the nature of intercellular substances; and classified tissues for comparison in different groups of plants. In cytology he showed that chloroplasts consist of protoplasm, and gave the name "protoplasm" to the "primordial utricle," explaining its rôle in cell division. In physiology he discovered the influence of contact on the movements of tendrils. He published 90 monographs, each of which represented a distinct contribution to botany, mostly in the fields of anatomy and histology. Perhaps his three most notable publications were *Vermischte Schriften botanischen Inhalts* (1845), a collection on various subjects, containing also a considerable number of his most important monographs; *Mikrographie* (1846); *Grundzüge der Anatomie und Physiologie der vegetabilischen Zelle* (1851). Von Mohl also established, in 1843, the *Botanische Zeitung*, which has continued to be one of the most influential of botanical journals. He remained its editor until his death in 1872.

MOHL, Julius von (1800–76). A German Orientalist, brother of Hugo and Robert von Mohl. He was born at Stuttgart, Oct. 28, 1800; studied Persian and Chinese at Tübingen, Paris, London, and Oxford; was professor of Oriental literature in Tübingen (1826–32); went to Paris and became professor of Persian at the Collège de France in 1847 and in 1852 inspector of the Oriental department of the national printing office. He died at Paris, Jan. 3, 1876. His

principal work is his edition of Firdausi's *Shāh Nāmah* (6 vols., 1838–66), of which he also made a complete French translation, published after his death, *Le livre des rois traduit et commenté* (1876–78). His reports to the Société Asiatique were collected after his death and published under the title *Vingt-sept ans d'histoire des études orientales* (2 vols., 1879–80). His *Lettres de M. Botta sur les découvertes à Khorsabad* (1845) relate to the excavations at Nineveh. His wife, who was Miss Mary Clarke (1793–1883), maintained for many years a salon frequented by the wits and scholars of her time. She was the author of a work on *Madame Récamier* (London, 1862). Consult Simpson, *Letters and Recollections of Julius and Mary Mohl* (London, 1887).

MOHL, Robert von (1799–1875). A German jurist and statesman, brother of Hugo and Julius von Mohl. He was born in Stuttgart, studied law at Heidelberg, Göttingen, and Tübingen, and in 1824, after publishing *Das Bundesstaatsrecht der Vereinigten Staaten von Nord-Amerika*, was made a professor of public law at Tübingen. In 1836 he was made head librarian of the university. But his attack on the political régime in 1845 forced him from his chair and from the government employ. Almost immediately afterward he was elected to the Lower Chamber of Württemberg, became professor at Heidelberg (1847), and was a member of the Vorparlament and of the National Assembly at Frankfort. After acting for seven months as Minister of Justice in the Imperial ministry set up by the Frankfort Parliament he returned to his professorial duties in Heidelberg (1849), and from 1857 represented the university in the First Chamber of Baden. From 1861 to 1866 he was representative of Baden at the German Bund at Frankfort, and during 1867–71 he was Envoy at Munich. In 1871 he was appointed president of the financial chamber of Baden. A year before Mohl's death he was elected to the German Reichstag from Baden. Among his writings are: *Staatsrecht des Königreichs Württemberg* (2d ed., 1840); *Die deutsche Polizeiwissenschaft nach den Grundsätzen des Rechtsstaats* (1832–34; 3d ed., 1866); *Encyklopädie der Staatswissenschaften* (1859; 3d ed., 1887); *Das deutsche Reichsstaatsrecht* (1873).

MÖHLER, mē'lĕr, Johann Adam (1796–1838). One of the most distinguished modern polemical divines of the Roman Catholic church. He was born at Igersheim in Württemberg, May 6, 1796. He received his education at the Gymnasium of Mergentheim, the lyceum of Ellwangen, and the University of Tübingen. He received priest's orders in 1819 and for a short time was employed in missionary duty. In 1823 he began to lecture on canon law and Church history at Tübingen and in 1826 became professor extraordinary, in 1828 professor ordinary, of theology. His earliest publication was *Die Einheit in der Kirche oder das Prinzip des Katholizismus* (1825), which was followed in 1827 by a historico-theological essay *Athanasius und die Kirche seiner Zeit*. His reputation rests mainly on his *Symbolik* (1832; Eng. trans., London, 1843, reprinted, 1894). This work led to a controversy with his Protestant colleague in the university, F. C. Baur (q.v.), and Möhler's two replies were important for Catholic theology (late editions, Ratisbon, 1900, Mainz, 1906). In 1835 Möhler removed to the University of Munich. His first appointment was nominally the chair of biblical exegesis, but he really devoted himself to the department of Church history, in which his opening course was eminently successful. He died in Würzburg, April 12, 1838. His miscellaneous works were collected and published posthumously in two volumes (Regensburg, 1839–40) by his friend Dr. Döllinger; his lectures on Church history by Gams (ib., 1867–70). Consult his biography by Wörner (Regensburg, 1866) and by Friedrich (Munich, 1894).

MOHLER, mō'lĕr, John Frederick (1864–). An American physicist, born at Boiling Springs, Pa. He graduated at Dickinson College in 1887 and at Johns Hopkins University (Ph.D.) in 1897. After teaching mathematics in academies at Dover, Del., and at Wilbraham, Mass., from 1887 to 1894, he became (1896) professor of physics at Dickinson. His researches include investigations on the surface tension of water below 0° C. He assisted in the discovery that the pressure surrounding the electric arc changes the wave length of the light emitted, and discovered the relation of the shift of spectral lines to the atomic volume, as well as a peculiarity in the light spectrum of magnesium. He also measured the pressure in the electric-light spark. His publications include *A Manual of Practical Physics* (1897–1903) and numerous articles in scientific journals.

MOHN, mōn, Henrik (1835–). A Norwegian meteorologist, born at Bergen and educated at Christiania. In 1860 he won the King's gold medal and obtained a government scholarship in astronomy, in 1861 became connected with the astronomical observatory, and in 1866 director of and professor in the meteorological institute of Christiania University. Mohn represented Norway in many international congresses of meteorology and was a member of the Polar Commission which organized magnetic and meteorological stations (1882 et seq.). His writings include: *Les orages dans la péninsule scandinave* (1888), with Hildebrandsson; a very valuable *Grundzüge der Meteorologie* (1875; 5th ed., 1898; trans. into Italian, Spanish, French, Russian, Polish, and Flemish); *The North Ocean, its Depths, Temperature, and Circulation* (1887); two large works: *The Norwegian North Polar Expedition, 1893–96*, vol. vi, *Meteorology* (1905); *Meteorology: Report of the Second Norwegian Arctic Expedition in the "Fram," 1898–1902* (1907).

MO'HO. A tropical tree. See Hibiscus.

MOHO. A honey sucker of the Sandwich Islands whose native name has become the designation of a local genus of the family Meliphagidæ, which contains two species, the yellow-tufted moho or o-o or uho (*Moho nobilis*) and another (*Moho apicalis*). They are handsome, long-tailed, blackish birds with bright yellow tufts of feathers on each side of the wings and some white tail feathers. After the disappearance of the mamo (q.v.) the feathers of the moho were used for making the ceremonial robes and ornaments of Hawaiian chiefs, until they were superseded by European clothes and insignia of rank. Early accounts of the islands record that this bird, which frequented the mountains and forests and had much the appearance and habits of a North American oriole, was captured by means of birdlime. Its yellow feathers having been plucked out, it was then freed, in hope that it would furnish an-

other supply the next year. These feathers, from which also a beautiful head-dress (for women) called leis was made, were received by the King as a poll tax; yet it took many years to collect enough for a mantle, the price of which, estimating the time and labor at modern standards, would probably exceed a million dollars. A few examples of these feather cloaks are preserved in European museums. See Plate of CREEPERS.

MO'HOCKS. The name by which the members of the Mohock or Mohawk Club of London in 1711–12 were known. The object of the club was mischief. With the Restoration it had become a favorite amusement of dissolute young gentlemen to swagger at night about the town, breaking windows, upsetting sedans, beating quiet men, and offering rude caresses to pretty women. The Mohocks, who formed one of the ruffian clubs of the time, made a specialty of slitting men's noses, beating people, and rolling women in hogsheads down Snow Hill. Prince Eugene of Savoy was charged by a Jesuit spy with having suggested that they should assassinate the Earl of Oxford. A royal proclamation dissolved the club after about a year's existence. Consult Jonathan Swift, *Journal to Stella* (new ed., New York, 1904).

MOHONK' LAKE. A summer settlement in Ulster Co., New York, 14 miles northwest of Poughkeepsie and 5½ miles from New Paltz, from which it is reached by stage. In the Shawangunk Mountains, it is situated on the north end of Lake Mohonk, which is fed by underground springs, at an elevation of about 1200 feet near the summit of "Sky Top," and is surrounded by mountain scenery of distinctive beauty. The settlement is the work of Albert Keith Smiley (q.v.), who purchased a large tract of land here in 1860 and in 1870 built a large hotel. The estate is beautifully laid out and consists of a tract of land of about 5500 acres. It is chiefly noted as the home of the Lake Mohonk Conference (q.v.).

MOHOS. See MOXOS.

MOHR (Ar. *muhr*, colt, from *mahara*, to be adroit). A West African gazelle (*Gazella mohr*), called the swift, and among the largest of its group, which is much hunted by the Arabs of Senegal because its stomach often contains the bezoars called mohr's eggs, so highly valued in Morocco and the western Sahara for their supposed medicinal properties. See BEZOAR.

MOHR, CHARLES THEODOR (1824–1901). An American botanist and forester. He was born at Esslingen in Württemberg, studied at the Stuttgart Polytechnic, and with Kappler explored Dutch Guiana in 1845. He went to California on the discovery of gold in 1849 and, after four years as a druggist in Louisville, Ky., removed to Mobile, Ala., in 1857. He was a member of the committee on revision of the United States Pharmacopœia in 1890, and in 1892 gave himself up to forestry and botany. He had been appointed botanist of the Alabama Geological Survey in 1884 and agent of the Forestry Division of the United States Department of Agriculture in 1889. He contributed to Berney's *Handbook of Alabama* and wrote *The Timber Pines of the Southern United States* (1896–97) and *Plant Life of Alabama* (1901).

MOHR, KARL FRIEDRICH (1806–79). A German chemist, born at Coblenz. He was educated at Heidelberg, Berlin, and Bonn, and then entered his father's apothecary business, to which he succeeded in 1840. He retired from business in 1857, and after financial losses became a lecturer in 1864 and professor of pharmacy in 1867 at Bonn. Before his death Mohr had become the best-known pharmaceutical chemist in Germany. His publications include: *Pharmacopœia Universalis* (2 vols., 1845); *Lehrbuch der pharmaceutischen Technik* (1847; 3d ed., 1866); a famous *Lehrbuch der chemisch-analytischen Titriermethode* (2 vols., 1855–59; 7th ed., 1896); *Geschichte der Erde* (1866; 2d ed., 1875).

MOHSITE. See ILMENITE.

MO'HUN, MICHAEL (?1625–84). A noted English actor of the period following the Restoration. He had been a soldier both in the Civil War and afterward in Flanders, where he got the title of major, by which he was known. He was a member of the company in the early days at Drury Lane, then the Theatre Royal, and created rôles in several of the plays of Dryden and of Lee. King Charles II, for whose father he had fought, regarded him highly. He died in London in October, 1684. Consult: Geneste, *History of the English Stage* (Bath, 1832); Doran, *Annals of the Stage* (ed. Lowe, London, 1888); Downes, *Roscius Anglicanus* (reprinted, ib., 1886).

MOIDORE, moi'dōr (Portug. *moeda d'our*, money of gold). A former gold coin of Portugal, of the value of 4800 reis, equivalent to 21s. 2d. or nearly $5.18. It was also called lisbonine.

MOIGNO, mwä'nyō', FRANÇOIS NAPOLÉON MARIE (1804–84). A French mathematician, born at Guéméné in Morbihan. He entered the Society of Jesus in 1822 and devoted himself to the study of mathematics and physics. During the revolution of 1830 he sought refuge with others of his order in Switzerland. In 1836 he became professor of mathematics at the preparatory school of Sainte-Geneviève in Paris. He resigned from his order in 1843 and became connected with various journals, of which he founded *Cosmos* (1852) and *Les Mondes* (1862). In 1873 he was appointed one of the canons of the chapter of Saint-Denis. Among his works are: *Leçons de calcul différentiel et de calcul intégral* (1840–61); *Répertoire d'optique moderne* (1847–50); *Saccharimetrie* (1869); *Les splendeurs de la foi* (1879–83); *Les livres saints et la science* (1884).

MOIR, DAVID MACBETH (1798–1851). A Scottish physician and author, born at Musselburgh, a small seaport near Edinburgh. He studied medicine and practiced in his native town. Moir became widely known by his essays and poems contributed to *Blackwood's Magazine* under the signature Δ (delta). He died July 6, 1851. Moir's most interesting production is a Scottish novel entitled *The Autobiography of Mansie Wauch* (1828; new ed., 1895). Consult also *Poetical Works*, edited with memoir by Aird (Edinburgh, 1852).

MOI'RA, second EARL OF. An English general and administrator in India. See HASTINGS, FRANCIS RAWDON-HASTINGS, MARQUIS OF.

MOIRE, mwär (Fr., mohair). A silk figured by the peculiar process called watering. The silks for this purpose are moistened and then folded from one end to the other in triangular folds. After being thus reduced to a comparatively small length they are submitted to heavy pressure, generally in a hydraulic press. After being removed from the press the fabric is

found to be covered with wavy lines. As only one side is to be waved, the fabric is made up for the press with a pasteboard above each second fold. The silk is next hot-pressed, and the side next to the pasteboard comes out glazed, while the other remains watered. The finest kinds of watered silks are known as moires antiques. The same process has been applied to woolen fabrics called moreen.

MOIS, mō'ĕz (an Annamese term corresponding to the Cambodian *Peunong*, Loatian *Kha*, Tonkinese *Myong*, *Muong*, etc.). An extensive group of so-called savage tribes dispersed over the table-lands and mountains between the Mekong and the Annamese coast, from the frontiers of Yunnan to Cochin-China. They have been regarded as one of the older groups of Farther Indian aborigines. In spite of the multitude of tribes into which the Mois are divided they exhibit a remarkable uniformity in physical type and manners. In physical type they are rather short, dolichocephalic, straight-eyed, somewhat wavy-haired, with reddish dirty-white skin. The Mois are as a rule of peaceful disposition, being hunters and husbandmen of a primitive sort. In the Mois a sub-Caucasic (white) physical trait has been detected, and others ally them, by reason of their manners and customs and implements, with the Malayan peoples. Consult Dourisbouve, *Les sauvages Ba-Hnars* (Paris, 1873), and Billet, *Deux ans dans le Haut-Tonkin, etc.* (ib., 1896). See Indo-Chinese.

MOISSAC, mwä'sȧk'. A town in the Department of Tarn-et-Garonne, France, on the river Tarn, 17 miles west-northwest of Montauban (Map: France, S., F 4). The church of St. Pierre, dating from the year 1100, has a portal with very unusual carving. There are also an abbot's palace, a communal college, a library, and a museum. Moissac has a good trade in flour, grain, oil, wine, poultry, and fruit. Pop., 1901, 8407; 1911, 8137.

MOISSAN, mwä'sän', Henri (1852–1907). A French chemist, born in Paris. He studied at the Museum of Natural History; became connected with the School of Pharmacy (1879), its professor of toxicology (1886) and of mineral chemistry (1889). In 1900 he was appointed professor at the Sorbonne. He won the Lacaze prize in 1887 for his valuable experiments with fluorine, which he was the first to isolate and to liquefy. Considerable notoriety attended his announcement, in 1893, that he had succeeded in producing artificial diamonds by suddenly chilling a molten mass of iron containing dissolved carbon. More practical was his simplification of the production of acetylene gas and his inorganic syntheses by the use of the electric furnace. In 1906 he was awarded the Nobel prize for chemistry. Moissan contributed articles on chromium, manganese, and iron to Frémy's *Encyclopédie chimique;* wrote: *L'Isolement du fluor* (1886); *Reproduction du diamant* (1893); *Carbure de calcium* (1894); *Etude complète des carbones amorphes et des graphites* (1898); *Classification des éléments* (1904); and edited an excellent *Traité de chimie minérale* (1905).

MOISTURE. See Humidity.

MOIVRE, mwä'vr', Abraham de. A French-English mathematician. See De Moivre.

MOJARRA, mō-här'rȧ (Portug. name). Any of many carnivorous sea fishes of moderate or small size, allied to the porgies (Sparidæ), and constituting the tropical family Gerridæ. Some of them are well known and of some importance as market fishes. The small silvery Pacific coast species of the genus *Eucinostomus* are called mojarritas. The mojarra blanca, or broad shad (*Xystæma cinereum*), is a favorite food fish on both coasts of Central America and in Cuba. Another species of that region (*Gerres olisthostomus*) is called Irish pompano and mutton fish by fishermen. The term is applied, by the aid of a discriminative adjective, to various outside fishes, e.g., the cow-pilot.

MOJI, mō'jē. A town of Japan situated at the north extremity of the island of Kiushiu, on the Strait of Shimonoseki and opposite the city of that name (Map: Japan, B 7). It has grown rapidly to an important place since 1891, when it became the terminus of the Kiushiu Railroad. The extensive coal deposits in the neighborhood also add to its importance. The Moji side of the channel, which is here 1 mile wide, is more convenient as a landing place for steamers than the port of Shimonoseki. The imports and exports at Moji in 1913 were valued at $19,687,969 and $10,406,112, respectively. Pop., 1903, 38,065; 1908, 55,682.

MOJOS. See Moxos.

MOJSISOVICS, moi'sē-sō'vĭch, Edmund von (1839–1907). An Austrian geologist and student of the Alps. He was born and educated at Vienna; founded the Austrian Alpine Society—the first of the kind in Europe—in 1862, and in 1869 a like association in Germany, which joined the Austrian society in 1873. In the Imperial Geological Institute he became chief geologist in 1870 and assistant director in 1892. He retired in 1901. His more important works include: *Das Gebirge um Hallstatt* (1873–76); *Die Dolomitriffe von Südtirol und Venetien* (1878–80); *Die Cephalopoden der mediterranen Triasprovinz* (1882); *Arktische Triasfaunen* (1886); *Die Cephalopoden der Hallstätter Kalke* (1873–1903); *Die Cephalopoden der oberen Trias des Himalaya* (1896).

MOKANNA, mō-kän'nȧ, Al. See Hakim ibn Allah; Mohammedan Sects.

MOKI, mō'kē. A Pueblo tribe of Arizona. See Hopi.

MOLA DI BARI, mō'lȧ dē bä'rē. A city in the Province of Bari delle Puglie, Italy, on the Adriatic Sea, 12 miles southeast of Bari (Map: Italy, F 4). The exports consist of oil, live stock, leather, and wine. Pop. (commune), 1901, 13,962; 1911, 14,911.

MOLA DI GAETA, dē gȧ-ā'tȧ. The old name of Formia (q.v.), a seaport in south Italy.

MOLALA, mō-lä'lȧ. See Waiilatpuan.

MOLA'RIA. A genus of arthropods, found fossil in the Stephen formation, of Middle Cambrian age, in British Columbia. It consists of a semicircular cephalic shield without any trace of eyes, a trilobed dorsal test, and a long slender telson. It is supposed to belong to the Arachnida and is placed in the family Aglaspidæ. Other similar forms are Habelia and Emeraldella. See Merostomata; Stephen Formation.

MOLAR WEIGHT. See Molecules.

MOLASSE, mō-lȧs' (Fr. fem. of *mol*, from Lat. *mollis*, soft). An extensive middle Tertiary deposit occupying the central lake region of Switzerland between the Alps and the Jura. It consists chiefly of sandstone, marls, and limestones, but at the foot of the Alps it usually

takes the form of a conglomerate called Nagel flue, which is said to attain the astonishing thickness of from 6000 to 8000 feet in some localities. The molasse includes the Oeningen group of strata, which is remarkable for its fossil insects and plants.

MOLAS'SES. See SUGAR.

MOLAY, mô'lā', JACQUES DE (c.1243–1314). The last Grand Master of the Templars. He was a native of Burgundy, and entered the Order of Templars in 1265, and was elected Grand Master in 1297. About this time Philip IV of France (1285–1314) undertook to carry out the project which he had formed to destroy the order, chiefly because the French monarchy was in sore financial straits and the Templars were wealthy. There was at this time constant talk of a new crusade, and Clement V called the Grand Master of the Templars to Europe. The call was answered by Molay, who appeared in France in the fall of 1306, accompanied by a chosen band of distinguished knights of the order. He repaired to Poitiers in 1307 to render his allegiance to the Pope, and was there informed of serious charges against the order. He went away believing that he had cleared the order and remained in high honor with the King. But the latter was working secretly through the officers of the Inquisition in France and procured the arrest of every Templar in France on Oct. 13, 1307; Jacques de Molay was seized in the house of the Temple and taken before special commissioners of the Inquisition. Although the Pope was indignant at this action on the part of Philip, and suspended the powers of the Inquisition in France, the King finally induced him to take part in the action. Molay was examined repeatedly by papal commissions, confessed the truth of some of the charges, and finally on March 18, 1314, he was condemned to perpetual imprisonment. He, however, immediately retracted all he had said, and thereupon was burnt the same evening, protesting the innocence of the order. Consult: F. Gmelin, *Schuld oder Unschuld des Tempelordens* (Stuttgart, 1893); Ernest Lavisse, *Histoire de France*, vol. iv, part ii (Paris, 1901); H. C. Lea, *History of the Inquisition of the Middle Ages*, vol. iii (new ed., New York, 1906). See TEMPLARS, KNIGHTS.

MOLBECH, môl'bĕk, CHRISTIAN (1783–1857). A Danish philologist and historian, born at Sorö. He had a position in the Royal Library at Copenhagen and was professor of literature in the university of that city from 1829 to 1843, being simultaneously codirector of the Royal Theatre. He wrote several works, critical, poetical, historical, and philological, the most important of which is a Danish dictionary (2 vols., 1828–33; 2d ed., 1854–59), the first of real value ever compiled. He also wrote a Danish dialect lexicon (1833–41) and a Danish glossary (1853–66). His other works include: *Dansk Haand-Ordbog til Retskrivnings og Sprogrigtigheds Fremme* (1813) and editions of *Den danske Riimkrönike* (1825); *Henrik Harpestrengs Lægebog* (1826); *Den ældste danske Bibel-Oversættelse . . .* (1828).

MOLBECH, CHRISTIAN KNUD FREDERIK (1821–88). A Danish poet and critic, born at Copenhagen, the son of Christian Molbech. He was professor of Scandinavian literature at the University of Kiel for 11 years (1853–64) and wrote several romantic dramas, such as *Klintekongens Brud* (1845), *Dante* (1842), *Venusbjerget* (1845), and *Ambrosius* (1878; 15th ed., 1909; Eng., Fr., Ger. trans.), and published collections of poems, such as *Billeder fra Jesu Liv* (1840), *Lyriske Digte og Romancer* (1863), *Dæmring* (1851; 3d ed., 1856), and *Efterladte Digte* (1888). As critic and theatrical censor Molbech was in touch with stage matters, and much of his work in this line is of interest. The most valuable contribution he made to the literature of his country was an excellent translation of Dante, *Den guddommelige Komedie* (4 vols., 1851–63; 4th ed., 1909).

MOLD (AS. *molde*, Goth. *mulda*, OHG. *molta*, dialectic Ger. *Molt*, dust, connected with Goth., OHG. *malan*, Ger. *mahlen*, Ir. *melim*, Lith. *malti*, Lat. *molere*, to grind). A term applied to various saprophytic fungi, but chiefly used in connection with the black molds (Mucorales). These molds are common on organic material, such as stale bread (kept moist and warm), fruits, fruit juices, etc., and possess a characteristic cobwebby, fleecy, white mycelium (q.v.), composed of large, often glistening and profusely branching hyphæ (see HYPHA). The common bread mold is *Rhizopus nigricans*, so named because the spores and sporangium stalk are dark, or often black, a fact which also suggests the common name, black mold. The ordinary mold on manure is *Mucor mucedo*. Recent investigations of the black molds have shown that the mycelia are sexually differentiated, so that two different strains must be brought together before the sex act occurs or even before the sex organs are formed. The term "mold" is also applied frequently to the so-called herbarium mold (*Aspergillus*), which occurs also on bread, preserves, etc., and to the blue mold (*Penicillium*) on bread, etc. These forms are usually differentiated from the black molds by being called blue and green molds. For black molds, see PHYCOMYCETES; and for blue and green molds, see ASCOMYCETES.

MOLDAU, môl'dou (Bohem. *Vitava*). The chief river of Bohemia and an important tributary of the Elbe (Map: Austria, D 2). It rises in the Böhmerwald, on the southwest frontier, at an elevation of 3800 feet above the sea, and flows first southeast, then northward past the city of Prague, and enters the Elbe opposite Melnik, after a course of 265 miles. It becomes navigable at Budweis, and by means of canalization vessels of 700 to 800 tons can reach Prague at any season.

MOLDA'VIA. A former principality in southeastern Europe, now forming, together with Wallachia (q.v.) and the Dobrudja (q.v.), the Kingdom of Rumania (Map: Balkan Peninsula, F 1). It is bounded on the north and east by the Pruth, which separates it from Russia, on the south by Wallachia, and on the west by Transylvania. Area, 14,759 square miles. Pop., 1899, 1,832,106; 1912, 2,145,464. The chief town is Jassy, the capital of the principality. For further description, see RUMANIA.

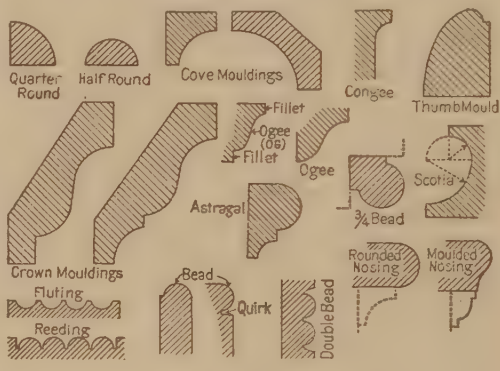
History. The Principality of Moldavia was founded about the middle of the fourteenth century by the Wallach Voivode Bogdan. Its cradle appears to have been in the northeastern Carpathians, near the sources of the Theiss. It soon grew to be a large state, embracing, in addition to the present Moldavia, Bukowina and Bessarabia. The dominion over this region was coveted by the kings of Poland and Hungary, and the Moldavian princes leaned now on the one power and now on the other, neither being able

permanently to assert its overlordship. Prince Stephen the Great was a powerful ruler (1457–1504). He defied the armies of the great Sultan Mohammed II, winning a signal victory over the Turks at Rakova in 1475. His successors, however, were unable to withstand the growing power of the Moslems, and early in the sixteenth century Moldavia became tributary to the Porte. The Turks proceeded to build fortresses in the Moldavian territory, and their hold on the country was gradually tightened, although Moldavia remained without the sphere of Turkish settlement. From the early part of the eighteenth century down to the outbreak of the Greek revolution in 1821, which began with Ypsilanti's brave deed at Jassi, Moldavia, as well as Wallachia, was governed by hospodars appointed by the Sultan from the aristocratic Greek families, known as Fanariots. The designs of Russia in the direction of dominion in the regions held in subjection by the Turks—designs which she sought to advance by claiming a protectorate over the Greek Christians in the Turkish dominions—violently affected the fortunes of Moldavia, which lay in the path of the Russian armies and was repeatedly subjected to Russian occupation. In 1812 Bessarabia was ceded by Turkey to Russia, Bukowina having been annexed to Austria in 1777. After 1821 native princes were once more at the head of the government. The protectorate accorded to Russia by Turkey in the Treaty of Adrianople (1829), which threatened to make Moldavia and Wallachia mere dependencies of Russia, was terminated by the Crimean War and the Treaty of Paris (1856). In 1859–61 Moldavia and Wallachia were united into the Principality of Rumania. In March, 1907, there was a peasant uprising, resulting in many deaths and great loss of property. See RUMANIA.

MOLDING. See FOUNDING.

MOLDING (from mold, OF. *moller, moler*, Fr. *mouler*, Sp., Portug. *moldar*, to measure, from Lat. *modulare*, to measure, from *modulus*, dim. of *modus*, measure, melody, manner, mode). A decorative strip or edging projecting or receding from the general surface adjoining it and having the same section or profile from end to end, the profile being usually composed chiefly or wholly of curves. Moldings are employed to frame pictures and panels, to decorate the edges of arches and openings, to form belts, bands, and cornices, and to emphasize all manner of architectural features, by the narrow lines or strips of modulated light and shade which they produce. Classic moldings generally project, Romanesque and Gothic moldings generally recede, from the general surface. Moldings may be plain or they may be carved with repeated ornament motives. In the classic styles there are eight typical moldings: the *fillet* and *bead* or *astragal*, very narrow projecting moldings, square and half-round respectively; the *cavetto* and *ovolo*, quarter-round moldings, respectively concave and convex; the *scotia*, half-elliptical concave, and *torus*, half-round convex; the *cyma recta* and *cyma reversa*, each composed of a quarter-round convex and quarter-round concave profile. The cyma or ovolo or group of moldings at the bottom of a cornice is called the *bed mold;* the cyma above the corona is the *cymatium;* the fillet at the top of the architrave is the *tænia*. In Romanesque and Gothic architecture the variety of moldings is greater, the hollows are deeper, the convex moldings bolder, and it is by the multiplying of rolls or *boutels*, hollows, oblique fillets and other profiles that much of the splendid decorative effect of Gothic interiors is produced, especially in English architecture. *Enriched* moldings are those which are carved with repeated ornaments—the bead-and-reel, egg-and-dart, water-leaf, acanthus, and anthemion in classic art; the zigzag, billet, dog-tooth, and beakhead in Romanesque art; the ball-flower, crocket, and leaves and vines of all sorts in Gothic art. While in the classic styles the convex moldings are the ones most generally carved, in Gothic art the chief adornments are in the hollows, in which the flowers or vines produce spots of light against the shadow. The Oriental styles make little account of moldings. Egyptian architecture knew only the bundle torus; in Assyrian and in Moslem design moldings hardly appear.

In carpentry and cabinetwork moldings are of the first importance and of great variety, with



FORMS OF MOLDING IN CARPENTRY.

special names for each—ogee, cove, thumb mold, plowed bead, bolection, etc. A picture molding is a horizontal strip of molding on a wall, from which pictures may be hung. The treatment of moldings constitutes one of the distinguishing marks of styles in architecture and decoration. See special articles on the different forms of molding above enumerated; also ORDERS OF ARCHITECTURE.

MOLDING SAND. Under this term are included siliceous sandy materials employed for making either molds or cores for use in casting iron, steel, bronze, brass, etc. The materials used vary in character from a loamy clay to a sand or even a gravel, often but not always of highly siliceous character, the grade of the material employed depending on the size or character of the casting, the kind of metal, or the portion of the mold in which the sand is to be used. Smaller castings and those with a smooth surface call for a fine sand, while large castings and cores used to fill the hollow spaces of the castings call for coarser material. One or more grades of sand may be mixed together, and the blending of molding sands is now quite extensively practiced both at the pit and foundry. But even so, certain foreign substances, as flour, oil, molasses, etc., may sometimes have to be added to increase the sand's bonding power. A molding sand should be strong enough to hold its shape in use, resistant to heat, and porous enough to permit the escape of gases but not admit the molten metal. Its value, then, depends on its physical properties, which are not indi-

cated by a chemical analysis but have to be determined by laboratory and foundry tests. Molding sands for ordinary work are obtainable at many places, but the better grades for finer work are less common and are obtained chiefly from the upper Hudson valley in New York and from the localities of Conneaut, Ohio, Newport, Ky., and Valparaiso, Ind. Consult: Kümmel and Parmalee, in New Jersey Geological Survey, *Annual Report* (Trenton, 1904); Ries and Rosen, in Michigan Geological Survey, *Annual Report* (Lansing, 1907); Heinrich Ries, *Economic Geology* (3d ed., New York, 1910); also *Proceedings of the Foundrymen's Association* (Cleveland).

MOLE (abbreviation of *molewarp, moldwarp, mouldwarp*, OHG. *moltwerf, multwerf*, Ger. *Maulwurf*, from AS. *molde*, dust + *weorpan*, Goth. *wairpan*, OHG. *werfan*, Ger. *werfen*, to throw). A small mammal belonging to the order Insectivora and to the family Talpidæ, although the name is often applied to other nearly related forms. It is a small animal, generally less than 8 inches in length, thickset, with short stout limbs, the anterior pair powerful and especially adapted for digging. The fur is dense and soft, lying backward or forward with equal ease; the tail is short; and the eyes are very small. In many species the eyes are covered over by a membrane, and recent investigations on the common American mole show that the eye itself is much degenerated and probably is of practically no use as an organ of sight. Moles are subterranean in their habits and more or less nocturnal. They are very voracious and eat animal food exclusively. The earthworm is the principal article in their diet, but all other worms, grubs, caterpillars, and insects are readily eaten, and in captivity raw meat, small birds and mammals, and even other moles, will be seized and eaten greedily. Although the limbs are short, moles are capable of very rapid movements. When in pursuit of earthworms moles often travel long distances underground, and frequently so near the surface that the earth becomes raised up above the tunnel which they make. Moles are therefore constantly hunted and trapped by gardeners. The favorite method of capture is by means of a trap set in one of these underground galleries. The simplest form of trap is a wire noose so arranged on a spring that when the mole enters it the spring is released and the wire is drawn taut.

Moles build very remarkable nests, or homes, consisting of two circular galleries, the smaller above the larger, and connected with it by five straight passages; at the centre is a chamber connecting with the upper gallery, while from the lower gallery horizontal passages run out in all directions. From these horizontal passages are given off the various subsurface tunnels made when the mole is in search of food. The central chamber and circular galleries are built in a mound of earth, more or less elevated above the surface, and larger than the ordinary heaps of earth, or molehills, thrown up by these animals. From the central chamber there is also a vertical tunnel leading downward and then bending upward again to join one of the horizontal galleries. The young are brought forth not in the central chamber, but in a special chamber formed where two or three horizontal galleries meet, which is lined with leaves and other warm materials. Four or five young ones are usually produced at a birth, and some writers state that a second brood is produced late in the summer. Moles take to water readily and swim well, so that they are able to cross considerable lakes and streams.

The anatomy of moles is interesting because it is so modified as to adapt the animal admirably to its manner of life. The fore limbs are attached to the skeleton so far forward that they lie beside the neck and thus add but little to the general width, yet remain sufficiently long to reach earth ahead of the nose. The hind limbs are also so arranged as not to occupy unnecessary space, the hip joints being closely approximated to the axis of the body. The humerus is very short and of a peculiar shape, and the carpals are very wide. On the inner (radial) side of the hand is a large sickle-shaped bone, regarded by some as a prepollex. The teeth vary in number from 36 to 44, in different genera. The Old World moles have 42 or 44 teeth, and the first and second upper incisors are of about the same size, while the moles of America have 36 or 44 teeth, and the first upper incisor is much larger than the second. The common mole of Europe (*Talpa europæa*) is very widely distributed, ranging from England to Japan and from the Altai to the Himalaya mountains. The eyes in this species are not covered by a membrane, as they are in the rest of the genus. The habits of the European mole have been carefully studied, and the remarks made above in regard to the burrows and nests of moles refer especially to that species. Seven other species of *Talpa* are known, chiefly Asiatic, but only two occur south of the Himalayas. Moles are absent from Africa and Australasia. Two peculiar moles occur in Tibet, one of which is placed in a distinct genus, as it has a somewhat narrower hand and only 42 teeth.

DENTITION OF THE MOLE.

The American moles belong to the genera *Scalops*, or *Scalopus*, having 36 teeth, webbed hind feet, and a narrow, slender muzzle; *Scapanus*, with 44 teeth and a narrow, tapering muzzle; *Parascalops* and *Condylura*, with 44 teeth and a remarkable snoutlike muzzle, fringed with a circle of about 20 slender, soft, cartilaginous processes. This last genus contains only a single species, the well-known star-nosed mole (*Condylura cristata*), which is not uncommon throughout the northern United States. Its very curious snout is somewhat piglike, but the fringing processes give it a unique appearance. In habits this species closely resembles the more ordinary moles. The common mole of the eastern United States (*Scalopus aquaticus*) is a rather shrewlike animal, partial to the banks of streams. No moles occur south of the United States.

The name mole is often given to other insectivorous burrowing mammals, as the mole shrew of northwestern America (*Neurotrichus gibbsii*), which in structure approaches the desman (q.v.) but in habits is somewhat like a mole. The golden moles (see GOLDEN MOLE) of South Africa belong to a different family, the Chrysochloridæ, and are not closely related to the Talpidæ, although in external appearance they are strikingly like them. There are seven or eight species in the single genus *Chrysochloris*. The

strange marsupial mole (q.v.) of southern Australia and the duck mole (i.e., the duckbill) are marsupials with more or less molelike appearance and habits.

Moles are found fossil throughout the Tertiary strata of Europe, a fact of great significance as showing how ancient must be the insectivorous type of mammals. The genus *Talpa* may be traced back even as far as the Lower Miocene, with its peculiarities of structure already well developed, while true members of the family Talpidæ appeared at least as early as the Lutetian in the Middle Eocene.

MOLE. See NÆVUS.

MOLE, GOLDEN. See GOLDEN MOLE.

MOLÉ, mō'lā', LOUIS MATTHIEU, COUNT (1781–1855). A French statesman, born in Paris. He was a descendant of the famous French magistrate Matthieu Molé (1584–1656), prominent at the time of the Fronde (q.v.). His father, president of the Parliament of Paris, died by the guillotine in 1794. After spending his early life in exile he returned to France, and first attracted notice by his *Essais de morale et de politique* (1805), in which he vindicated the government of Napoleon on the ground of necessity. The attention of the Emperor was then drawn to him; he was appointed to various offices in succession, was raised to the dignity of a count, and became Minister of Justice (1813). After Napoleon's return from Elba he refused to subscribe to the declaration of the Council of State banishing the Bourbons forever from France, and declined a seat in the Chamber of Peers. In 1815 Louis XVIII made him a peer of France. In 1817 he was for a short time Minister of Marine, but afterward acted independently of party, and was one of the principal orators in the Chamber of Peers. In 1830 he became Minister of Foreign Affairs in Louis Philippe's first cabinet, but remained in office only a short time. From 1836 to 1839 he was Prime Minister as successor to Thiers. He also held the portfolio of Foreign Affairs. In 1840 he was chosen a member of the French Academy. From that time he took little part in political affairs, but after the revolution of 1848 exerted himself to rally and unite the party of order in the National Assembly, to which he had been elected. After the coup d'état he retired to private life.

MOLECH, mō'lĕk. The name or designation of a deity referred to in the Old Testament. It is generally recognized that the form Molech is an intentional distortion of *melek* by the substitution of the vowels of *bosheth* (shame). Most of the passages in which it occurs have reference to human sacrifice as forming a part of the cult of this deity, and particularly to child sacrifice or the sacrifice of the firstborn, referred to as "passing through the fire." (Lev. xviii. 21; 2 Kings xxiii. 10.) This phrase only implies that the victims were "given over" to the deity as a sacrifice, first slain and then burnt, as is evident from Ezek. xvi. 20 f., xxiii. 39; Jer. vii. 31, xix. 4 ff.; Deut. xii. 31; and other passages. At a later time, when all memory of the rite had passed away, the expression was explained by imaginary tales of children walking or leaping alive through the flames as an ordeal or of their being burned to death in the arms of an idol. There is no foundation for these stories. As to the god to whom these sacrifices were offered, scholars generally hold that Yahwe is meant. He is often designated as *ha-melek* (the king). (Isa. vi. 5; Jer. lxvi. 18, xlviii. 15; and elsewhere.) The testimony of Jeremiah (vii. 31) and of Ezekiel (xvi. 20 f., xxiii. 37 ff.) is sufficient to prove that the rite survived among the Jews to a comparatively late period, though very possibly it was only a last resort, in time of great distress, to avert disaster or placate an angry deity, as was the case among the Moabites (see MESHA), and also that such offerings were made to Yahwe, since Jeremiah takes pains to deny that Yahwe had commanded them, and Ezekiel explains that Yahwe had indeed given them statutes that were not good, and defiled them by their sacrificial gifts in offering every firstborn, but only to fill them with horror. The law to which Ezekiel refers is clearly that of Ex. xiii. 12: "Thou shalt offer every firstborn to Yahwe." The anxious question of Mic. vi. 7: "Will Yahwe accept thousands of rams, ten thousand streams of oil? shall I give my firstborn for my transgression, the fruit of my body for the sin of my soul?" also shows how earnestly this sacrifice was contemplated as the supreme test of devotion to Yahwe. But the historian censures Ahaz for following the manner of the nations in performing the rite (2 Kings xvi. 4); it is forbidden in Deut. xviii. 10 and Lev. xviii. 21, xx. 2–6, and provision is made for the redemption of the firstborn. (See FIRSTBORN.) It has been supposed that the custom came into vogue in the days of Manasseh through Assyrian influence; but there is as yet no trace of it in Assyrian literature. Since it existed to a late time among the Carthaginians, it has been conjectured that it came into Judah from Phœnicia in the seventh century. It is probable, however, that it had existed sporadically from the earliest times among the Hebrews. While it manifestly was connected with the Yahwe cult, there is room for a question whether the Melek to whom the offering was made was always thought of as identical with Yahwe, or was not sometimes considered as a separate deity. As the Canaanites (including the Phœnicians) had their Milk and Melkart (cf. Abu Milki in the Tel el Amarna tablets and Milk Natan in later inscriptions), the Ammonites their Milcom (q.v.), and the Edomites their Malik (cf. Malik Ramu in an Assyrian text), so Israel and Judah may also have recognized a distinct Melek, of whose worship the child sacrifice was a prominent feature. The tone of some of the denunciations and legal prohibitions strongly suggests this. It is even possible that the commandment to offer the firstborn to Yahwe (Ex. xiii. 12, xxii. 29) was at first a protest against offering them to Melek or any other Baal, and the arrangement for redeeming them a later method of combating both the child sacrifice to Melek and its use in the worship of Yahwe in his capacity of melek, or king.

Bibliography. Baudissin, *Jahve et Moloch* (Leipzig, 1874); Baethgen, *Beiträge zur semitischen Religionsgeschichte* (Berlin, 1888); Eerdmans, *Melekdienst* (Leyden, 1891); Kamphausen, *Das Verhältnis des Menschenopfers zur israelitischen Religion* (Leipzig, 1896); Moore, "Molech," in *Encyclopædia Biblica* (London, 1902); Benzinger, "Moloch," in *Die Religion in Geschichte und Gegenwart* (Tübingen, 1913).

MOLE CRICKET. Any one of the crickets of the genus *Gryllotalpa* and its close allies, forming a tribe Gryllotalpides, remarkable for the dilated front legs, which superficially resemble those of the mole, and which are admirably adapted to an underground life. The en-

tire existence of the insect is subterranean. It travels in burrows of its own digging, and lays its eggs and rears its young in the same excavation. The adaptation of the front legs to the economy of the insect is very striking, as the tibiæ and tarsi are so arranged as to act as shears with which rootlets are severed. Mole crickets are furnished with a curious auditory apparatus on the front leg below the knee, concealed in a deep fold of the surface. The male makes a sound which has been reduced to a scale by Scudder, and which differs from the songs of the other crickets. Sharp calls it a "dull, jarring note somewhat like that of the goatsucker." The mole cricket is principally carnivorous in its diet, although it feeds also to some extent upon vegetation, and the principal damage it does is in cutting roots which come in the way of its burrows. It is considered the most destructive insect to agriculture in Porto Rico, where it is called changa. The female lays from 200 to 400 eggs, and the young are at first gregarious, the mother watching over them and supplying them with food until their first molt; after this they disperse and begin to make burrows for themselves. These young are often devoured by the adult males. Consult David Sharp, "Insects," in *Cambridge Natural History*, vol. v (London, 1895), and O. W. Barrett, *The Changa, or the Mole Cricket* (Washington, 1903). See illustration under CRICKET.

MOL'ECULES—MOLEC'ULAR WEIGHTS (Fr. *molécule*, from Neo-Lat. *molecula*, dim. of Lat. *moles*, mass). It is now universally assumed by chemists and physicists that all bodies are made up of very small but finite material particles, the weight and composition of which determine the various properties of substances. These particles are called molecules. Each of these molecules is conceived to be formed by a group of elementary atoms, the sum of whose weights equals the weight of the molecule. When a substance is divided and subdivided by physical or mechanical means (e.g., by dissolving a small amount in a very large volume of some liquid and dividing the latter into small portions), its molecules become separated from one another without undergoing any change. When the substance is decomposed chemically, each molecule breaks up and its unity is destroyed. Atoms cannot be subdivided even by chemical changes of the substance containing them; and as up to the beginning of this century physical and chemical changes were the only types of change known and the only ones considered at all possible, atoms were assumed to be "incapable of subdivision by any means whatever." At present it may be considered as a definitely established fact that atoms undergo decomposition —true subdivision—during all radioactive processes. See ELECTRON; HELIUM; RADIUM.

The relative weights of molecules, termed molecular weights, are among the most important constants of nature, and their experimental determination presents no difficulty whatever. But it has been shown that even the absolute dimensions of molecules, their absolute weight, their actual number in a given volume of substance, their specific gravity, etc., can be ascertained with a high degree of probability. Brief mention may be made here of some of the simpler methods employed in searching for those absolute dimensions in the unseen world of molecules. Such theoretical researches are carried out mainly on the principle that when a hypothesis is admitted within the scope of an exact science we must have exhaustive knowledge of the deductions that can possibly be made from it. Only by correlating the deductions with facts can we judge whether the hypothesis is reliable or not, and experience teaches that deductions seemingly incapable of experimental verification may ultimately not be so at all. Of course, the calculation of the absolute dimensions of molecules is also fascinating in itself. Like certain speculations in astronomy, it shows that there is no limit in the depth of the invisible and inaccessible beyond which scientific thought may not be expected to penetrate.

ABSOLUTE DIMENSIONS OF MOLECULES

The fundamental hypotheses of the kinetic theory of gases lead to the proposition that at any given temperature the volume of a gas is inversely proportional to its pressure. This relation, which had been known as a matter of fact long before it was established deductively, may also be expressed by saying that at any given temperature the product of the pressure and volume of a gas is constant:

$$pv = c.$$

From the point of view of the kinetic theory, v represents in this formula the empty space within which the molecules of the gas are free to move—i.e., the total volume filled by the gas *minus* the volume actually occupied by its molecules and *minus* a certain further fraction of the volume rendered unavailable by the disorderly motions of the molecules. As long as the gas is not too highly compressed, the total volume may be used in the above formula instead of the unknown intermolecular space. For, under low pressures, the difference between the volume of a gas and the volume of its empty intermolecular space is very slight, and hence the error committed amounts practically to nothing. But as the pressure exerted on the gas increases its volume becomes small, and the fraction of that volume rendered unavailable by the bulk of the molecules and by the irregularity of their motion becomes considerable. In other words, the difference between the volume filled by the gas and the available intermolecular space becomes too great to be neglected. At the same time, as the distance between the molecules becomes smaller they begin to exercise a certain amount of attraction upon one another; the result is that the tendency of the gas to expand and the pressure exerted by it upon the containing vessel are appreciably diminished. Under such circumstances the simple formula mentioned above ceases to express the relation between the observed pressure and volume of gases, and the following formula, first constructed by Van der Waals, has to be employed instead:

$$\left(p + \frac{a}{v^2}\right)(v - b) = c.$$

In this formula p denotes the pressure actually observed. To conform to the theoretical law, we add to p the quantity $\frac{a}{v^2}$ depending on the specific mutual attraction of the molecules and therefore also upon the volume occupied by the gas. The factor $(v - b)$ in the formula represents the total volume filled by the gas, diminished by four times the volume actually occupied by its molecules, which are assumed to be

spherical. We thus obtain theoretically a set of ideal conditions, such as are in reality approached only when the volume occupied by the gas is very great. We have, namely, the ideal pressure—i.e., the pressure determined by the motion of the molecules and undiminished by their mutual attraction—and we have the actual volume within which the molecules are free to move; the product is evidently the same as in the case of the simpler law, $pv = c$, under low pressures.

The attraction of the molecules and their volume depend, of course, upon the nature of the gas. By actually determining the pressures and volumes of various gases, numbers may be substituted for c, p, and v in Van der Waals's formula, and thus equations may be obtained containing only two unknown quantities, a and b, the numerical values of which can then be easily computed. The following table shows the values of $\frac{1}{4}\ b$ (i.e., *the fraction of the volume of a gas actually occupied by its molecules*) for a few gases and vapors. These values are calculated for the temperature of freezing water (0° C.) and for normal atmospheric pressure:

SUBSTANCE	$\frac{1}{4}\ b$
Carbonic-acid gas	0.00050
Nitrous-oxide gas	0.00078
Sulphur-dioxide gas	0.00062
Ethylene gas	0.00053
Ethyl-chloride vapor	0.00097
Alcohol vapor	0.00093
Ether vapor	0.00141
Benzene vapor	0.00128
Carbon-disulphide vapor	0.00082

With the aid of these figures the specific gravity of the molecules, say of carbonic acid, may be readily calculated as follows: at 0° C. and under normal atmospheric pressure, 22,405 cubic centimeters of carbonic-acid gas weigh about 44 grams. The volume actually occupied by the molecules being $22{,}350 \times 0.00050$ cubic centimeters, *one* cubic centimeter entirely filled by carbonic-acid molecules, with no space between them, would evidently weigh

$$\frac{44}{22{,}350 \times 0.00050}$$

or about 4 grams; i.e., the specific gravity of a molecule of carbonic acid is about 4. Similarly, the specific gravities of the molecules of other substances are found to be as follows:

SUBSTANCE	Sp. gr. of molecules
Nitrous oxide	3.7
Sulphur dioxide	4.6
Ethylene	2.4
Ethyl chloride	2.9
Alcohol	2.2
Ether	2.3
Benzene	2.7
Carbon disulphide	4.3

Considerations of a somewhat more complicated nature lead to the conclusion that at 0° C., and under a pressure of 1 atmosphere, 1 cubic millimeter of *any gas or vapor* contains approximately 54,000,000,000,000,000 molecules. Since 1 cubic millimeter of hydrogen weighs 0.00009 milligram, the absolute weight of a single molecule of that gas is therefore

$$\frac{0.00009}{54{,}000{,}000{,}000{,}000{,}000},$$ which equals

0.000,000,000,000,000,000,00166 milligram.

In a similar manner the absolute weight of a molecule of any other gas or vapor may be readily calculated, by dividing the weight of one cubic millimeter by 54,000,000,000,000,000.

MOLECULAR WEIGHTS

The practical value of the above results is, at least for the present, not nearly so great as that of the purely relative molecular weights constantly used in scientific work. For it is on our knowledge of these relative molecular weights that the modern theories concerning the structure and the mutual relations of chemical compounds, especially the numerous compounds of carbon, are based.

The principle underlying the determination of the relative molecular weights of gaseous or vaporized substances is Avogadro's rule (q.v.), according to which equal volumes of gases (under the same pressure and at the same temperature) contain equal numbers of molecules. Let a given volume of some gas weigh g_1 grams and let, under the same conditions, an equal volume of some second gas weigh g_2 grams. If the weight of a single molecule of the first gas is m_1 and the number of molecules in one volume is n_1, then the total weight g_1 is obviously the product of m_1 and n_1: $g_1 = m_1 n_1$. Similarly, if m_2 and n_2 are, respectively, the weight of a single molecule and the number of molecules of the second gas, then $g_2 = m_2 n_2$. But, the two volumes being equal, Avogadro's rule tells us that $n_1 = n_2$. Consequently we have

$$\frac{g_1}{g_2} = \frac{m_1 n_1}{m_2 n_2} = \frac{m_1}{m_2}.$$

In words: the ratio of the weights of two *single molecules* of different gases is the same as the ratio of the weights of *equal volumes* of the gases under the same conditions of pressure and temperature. And of course the weights of equal volumes of gases can be readily determined.

Chemists have agreed to call "molecular weight" or "molar weight" the weight of 22.407 liters of any gas or vapor at 0° C. and under a pressure of 1 atmosphere (i.e., 760 millimeters of mercury or, what is the same, a pressure of 1033.3 grams per square centimeter). The volume just mentioned is that occupied by exactly 32 grams of oxygen gas, and so 32 is given as the molecular weight, or molar weight, of oxygen.

In most cases it would be inconvenient, or even impossible, to put vapors at 0° C. under a pressure of 1 atmosphere; most vapors would be liquefied before this pressure is reached. In practice, therefore, the chemist determines the weight of some convenient volume (say 250 or 300 cubic centimeters at most) and under convenient conditions of pressure and temperature. Then, using the gas laws, he calculates what *would* be the weight of 22.407 liters under the normal conditions. The gas laws are mathematically expressed by the equation

$$PV = RT,$$

where V denotes the volume occupied by the molar weight of the gas under the pressure P and at the temperature T; the symbol R denotes the so-called gas constant, and its numerical value (when volumes are measured in liters, pressures in atmospheres, and temperatures on the absolute scale) is 0.0820. If we denote by M the molar weight of a gas and by v its specific volume (i.e., the volume occupied by 1 gram), then obviously $V = Mv$. The equation of the gas laws may, therefore, be written:

$$PMv = RT, \text{ or } 0.0820T,$$

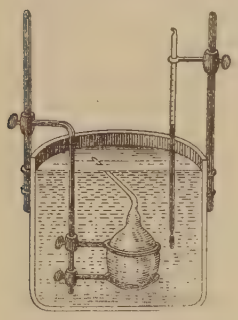
and therefore

$$M = \frac{0.0820T}{Pv}.$$

Thus in any given case the molar weight M becomes known if T, P, and v have been determined. This last equation may be referred to as the molar-weight formula.

Turning to the practical methods of carrying out such determinations, we find a method described by Menzies in 1910, which consists in fixing beforehand the temperature T and the specific volume v and determining what the pressure P will be when at the temperature T the gas has been forced to occupy, per gram, the volume v. In 1912 Porter described a practical procedure which consists in fixing beforehand the pressure and the specific volume and determining at what temperature the given vapor will under the pressure P occupy, per gram, the fixed volume v. Both these methods may be found explained in detail in the *Journal of the American Chemical Society*. The purposes of the present sketch will be served best by a description of the older, classic methods, which are still most commonly used in chemical laboratories. In these methods it is T and P that are fixed beforehand, and what is sought is the specific volume v of the gas under those fixed conditions of temperature and pressure. Following are the apparatus used:

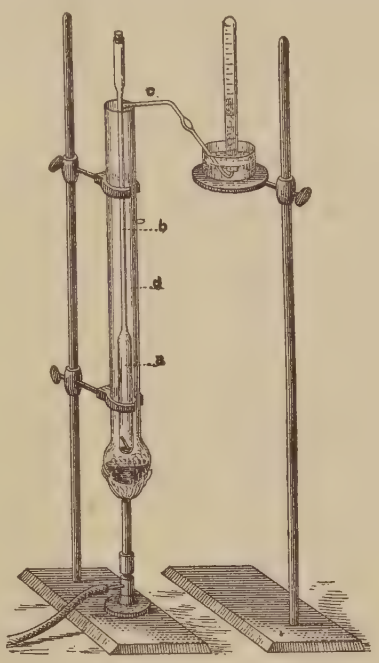
A. *Dumas's Apparatus* consists of a light glass flask (of about 250 cubic centimeters' capacity), whose neck is bent and drawn out into a long and narrow point. After carefully weighing the flask, 15 or 20 grams of the substance to be examined are introduced into it; it is then immersed in a bath whose temperature is constant and from 30 to 50 degrees higher than the boiling temperature of the substance in the flask.



DUMAS'S APPARATUS.

The substance soon begins to boil, and its vapors drive all the air out of the flask. When the substance has completely evaporated and the flask contains nothing but its vapor, the open end is carefully sealed off with the aid of a blowpipe. On cooling, the flask is cleaned and again weighed. Finally, its end is broken off under water, which rushes into the flask owing to the low pressure within; and when the latter is completely filled it is weighed a third and last time, together with the end that has been broken off. From the three weighings the weight and the volume of the vaporized substance in the apparatus become known. Dividing the volume (expressed in liters) by the weight, we get the specific volume v required by the molar-weight formula given above. The temperature T is that of the bath; the pressure P is that of the air as shown by the barometer, but expressed in atmospheres. Dumas's apparatus can be employed only when a considerable amount of substance is available.

B. *Victor Meyer's Apparatus* consists of a wide glass tube a, the lower end of which is closed and the upper joined on to a long glass tube b of smaller diameter. The narrow tube is provided, near its upper end, with a side tube c. During a determination this apparatus is placed in a long test-tube-like vessel d containing some liquid boiling at a higher temperature than the substance to be experimented upon. A little of the substance is carefully weighed in a small glass capsule; the rubber stopper closing the top end of the apparatus is for an instant removed, and the weighed capsule is dropped in. The substance quickly evaporates, driving out through the side tube c a volume of air equal to the volume of its own vapor. The air is collected in a graduated tube, and thus the volume of the vaporized substance becomes known. Dividing the volume by the weight employed gives the required specific volume. The temperature T is that of the graduated tube at the time of observing the volume; the pressure P is that prevailing within the graduated tube at the same time—usually the same as the barometric pressure outside. Victor Meyer's apparatus requires but a very small quantity of the substance that is to be experimented upon, which is an important advantage; for the preparation of large quantities of a substance may often involve great loss of time and also be very difficult.



VICTOR MEYER'S APPARATUS.

Effusion Method. An entirely different method of determining the relative molar weights of gaseous substances is based on a law discovered by Graham. When different gases are, under similar conditions, allowed to escape through a small opening, the lengths of time taken by equal volumes of the different gases to escape are proportional to the square root of the weights of those equal volumes. In other words, the weights of equal volumes of different gases are proportional to the square of the times of effusion. But as, according to Avogadro's Rule, the weights of equal volumes are proportional to the molecular weights, we may say: *the molecular weights of gases or vapors are proportional to the square of the times of effusion*, a proposition which may be called the Graham-Avogadro law. Denoting the times of effusion of two given

gases by t_1 and t_2, and their molecular weights by M_1 and M_2, we have

$$\frac{M_1}{M_2} = \left(\frac{t_1}{t_2}\right)^2.$$

In practice one chooses as a reference substance some gas of known molecular weight, say oxygen, with the molecular weight 32 (M_2 in our formula), and determines the time of effusion of a suitable volume of it under practically convenient conditions of temperature and pressure (the time t_2 in our formula). Then one determines the time of effusion (t_1) of the gas whose molecular weight (M_1) is required. The latter is then given by the expression:

$$M_1 = M_2\left(\frac{t_1}{t_2}\right)^2.$$

A valuable advantage of the method consists in the fact that it requires but very small amounts of substance, so that Debierne was able to use it in the case of so scarce a substance as the emanation of radium. The method is much used as a test in the illuminating-gas industry. The gases are allowed to effuse out of a glass tube the open lower end of which is immersed in a cylinder of mercury, the upper end being sealed with a disk of platinum having an effusion hole whose diameter should be at most one four-hundredth of the thickness of the disk.

Determination of Molecular Weights by Direct or Indirect Measurement of the Osmotic Pressure of Solutions. As Van't Hoff has shown, substances in solution exert an "osmotic pressure" which is in a sense analogous to the pressure of gases or vapors and in very dilute solutions obeys the same law as the pressure of gases. If we denote by π the osmotic pressure, by V the volume (in liters) of solution containing the molar weight of the dissolved substance, and by T the absolute temperature, we thus have

$$\pi V = RT,$$

where R is again the "gas constant" and has the value 0.0820. If, further, we denote by v the volume of solution containing *one* gram of the dissolved substance, and by M the molar weight of the latter, our equation may be written:

$$\pi v M = RT,$$

from which we obtain a molar-weight formula analogous to the one given above for gases and vapors: viz.,

$$M = \frac{0.0820T}{\pi v}.$$

Thus, by measuring the osmotic pressure π of a solution of a given dilution at a given temperature, we can ascertain the molar weight M of the dissolved substance. But as the direct measurement of osmotic pressure is exceedingly difficult, indirect methods are usually employed by the investigator. When a substance enters some solvent, say water, it changes the characteristic freezing and boiling temperatures of the solvent: the freezing point is lowered, the boiling point is raised. Now, the depression of the freezing point and the elevation of the boiling point have been shown to be proportional to the osmotic pressure of the solution. Therefore, instead of directly carrying out a determination of osmotic pressure, the chemist measures the change of freezing or boiling temperature caused by dissolving a given weight of substance. The laboratory methods commonly employed in determining the depression of freezing point and the rise of boiling point are described in the articles FREEZING POINT and BOILING POINT. See also SOLUTION; AVOGADRO'S RULE.

The osmotic-pressure methods just referred to are of the greatest practical importance to the chemist, for, while the number of substances that can be vaporized (and hence whose molecular weights can be determined by the vapor-density method) is limited, practically all substances can be obtained in solution.

Chemical Methods. It is often possible to determine the molecular weight of a substance by purely chemical methods, i.e., by studying its formation and chemical transformations. Consider, e.g., acetic acid. Analysis leads us to assign to it one of the following formulas: CH_2O, $C_2H_4O_2$, $C_3H_6O_3$, $C_4H_8O_4$, etc., corresponding to the molecular weights, 30, 60, 90, 120, etc. (See CHEMISTRY.) The fact that acetic acid is readily formed from ordinary alcohol, whose molecule (C_2H_6O) cannot possibly contain less than two carbon atoms (because for every two carbon atoms it contains a single atom of oxygen)—this fact renders it probable that the molecule of acetic acid, too, contains two carbon atoms. In other words, it becomes probable that $C_2H_4O_2$ is the formula, and hence 60 the molecular weight, of acetic acid. That CH_2O cannot be the formula of acetic acid is shown by the fact that the molecule ($C_2H_3O_2Ag$) of silver acetate, a compound made from acetic acid, cannot possibly contain less than two carbon atoms (because for every two carbon atoms it contains a single atom of silver). To sum up, the molecular weight of acetic acid is shown by purely chemical methods to be *probably* and *at least* 60. More exact information chemical methods cannot furnish. The *physicochemical* methods described above lead usually to much more definite conclusions. And because the molecular weights found by physical methods (i.e., on the basis of Avogadro's rule) are invariably found to be in perfect agreement with chemical facts, the molecular theory of the physicist can be, and is, inseparable from the atomic theory of the chemist, the two theories widening each other's scope of usefulness and together forming a powerful instrument for the study of nature.

See CHEMISTRY, and consult the literature of theoretical and physical chemistry recommended in that article. See also ATOMIC WEIGHTS; AVOGADRO'S RULE; BOILING POINT; FREEZING POINT; GASES, GENERAL PROPERTIES OF; SOLUTION.

MOLENAER, mō'le-när, JAN MIENSZE (?c.1605–68). A Dutch genre painter, born at Haarlem. He is thought to have been a pupil of Frans Hals, whom he imitated in his early works. Later he was influenced by Rembrandt. His pictures are usually scenes of peasant life, painted with much brilliancy and variety of characterization, combined, in his later works, with compactness of composition and subordination of local color to a warm brown tone. Good examples of his early manner are a "Scene in a Painter's Studio" (Berlin Gallery) and "A Family Party" (Van Loon collection, Amsterdam). In his later manner are "Grace before Meat" (Rijks-Museum, Amsterdam) and "A Flemish Wedding" (Haarlem). In 1636 he married Judith Leyster, one of the few distinguished women painters of that day.

MOLE RAT. One of the rodents of the family Spalacidæ, which spend their lives moving

about through the soil like moles and have assumed many molelike features and traits. The countries about the Mediterranean contain the typical mole rat (*Spalax typhlus*), a queer, yellowish-brown creature about the size of a rat, with the minute eyes completely covered by the skin and the ears and tail rudimentary. Its fur lies either way, and the animal seems able to dig backward as well as forward. It constructs tunnels like those of moles, throwing out heaps of earth at intervals. It is common in Egypt, where it burrows in sandy soil full of asphodels and hyacinths, whose bulbs it eats or stores in large quantities in deep chambers underground. South Africa contains several closely related animals of the subfamily Bathyerginæ, one of which, the coastwise strand mole (*Bathyergus maritimus*), is a foot long and numerous. Its eyes are still open, but are mere beads, of little use. Still stranger relatives of these are the sand rats (*Heterocephalus*) of Somaliland, which are about the size of mice, almost naked and blind. They remain always underground, tossing the sand out of the crater-like openings from their tunnels, but never themselves coming to the surface.

MOLESCHOTT, mō'le-shŏt, JACOB (1822–93). A physiologist and writer on dietetics, born at Herzogenbusch, Holland. He studied at Heidelberg and began the practice of medicine (1845) at Utrecht. Thence he removed, in 1847, to Heidelberg, where for seven years he lectured on physiology at the university. A real or supposed tendency towards materialism in his lectures alarmed the authorities, and in consequence he resigned. In 1856 he was appointed professor of physiology at the polytechnic at Zurich and in 1861 at Turin. He was called upon to fill the same chair in Rome in 1879; three years earlier he had been appointed a Senator of the Kingdom. He was a popular lecturer, and his physiological researches, particularly in regard to diet, muscular formation, the blood, and bile, are of value. Without asserting the impossibility of a spiritual life, he explained the origin and condition of animals by the working of physical causes. His characteristic formula was "No thought without phosphorus." His most important works are: *Physiologie der Nahrungsmittel* (1850; 2d ed., 1859); *Physiologie des Stoffwechsels in Pflanzen und Thieren* (1851); *Der Kreislauf des Lebens* (1852; 5th ed., 1887); *Untersuchungen zur Naturlehre des Menschen und der Tiere* (1856–93; continued after his death by Colosanti and Fubini); *Lehre der Nahrungsmittel* (1858); *Sulla vita umana* (1861–67), a collection of essays; *Physiologisches Skizzenbuch* (1861); *Consigli e conferti nei tempi di colera* (1864; 3d ed., 1884); *Sull' influenza della luce mista e cromatica nell' esalazione di acido carbonico per l' organismo animale* (1879), with Fubini. *Kleine Schriften* (1880–87) contains his collected essays and addresses. After his death appeared his autobiography *Für meine Freunde* (1894).

MOLE SHREW. A book name for the common North American short-tailed shrew (*Blarina brevicauda*). See SHREW.

MOLE'SKIN (so called from its soft, thick shag, like the fur on a mole). An extra-strong double-twilled fustian, dyed after the pile is cut. See FUSTIAN.

MOLESWORTH, mōlz'wĕrth, SIR GUILFORD LINDSEY (1828–). An English civil engineer. He was educated at the college of civil engineers at Putney. In 1852 he became chief assistant engineer of the London, Brighton, and South Coast Railroad, but soon resigned to conduct the constructions at Woolwich Arsenal during the Crimean War. After practicing his profession in London for a number of years he went to Ceylon in 1859 and in 1862 became chief engineer of the government railroad in that island. In 1867 he was appointed Director of Public Works and Director General of Railways to the Ceylon government and from 1871 to 1889 was consulting engineer to the Indian government with regard to State railways. He received medals from the British government for his services during the Afghan War and the Burma War. In 1904 he was president of the Institution of Civil Engineers. He published a *Pocket-book of Engineering Formulæ* (27th ed., 1914), which is regarded as authoritative. Among his other publications are: *State Railways in India* (1872); *Metrical Tables* (1880; 4th ed., 1909); *Imperialism in India* (1885); *Silver and Gold* (1891); *Our Empire under Protection and Free Trade* (1902); *Economic and Fiscal Facts and Fallacies* (1909).

MOLESWORTH, MARY LOUISA, *née* STEWART (1839–1921). An English writer of books for young people, born in Holland and educated in Switzerland. She spent some time in France and Germany. She wrote several novels while young, and in 1875 published her first book for children. As a writer of juveniles her success was immediate. Through a delightful verisimilitude and an easy grace of style she found wide audience for many volumes, among which are: *Carrots* (1876); *Tapestry Poems* (1879); *The Green Casket* (1890); *The Laurel Walk* (1898); *The Grim House* (1899); *Jasper* (1906); *The Story of a Year* (1910); *Fairies Afield* (1911). Of *The Cuckoo Clock*, a classic of its kind, a new and handsome edition was published in 1914.

MOLESWORTH, SIR WILLIAM (1810–55). An English statesman, known as the originator of colonial self-government. He was born in London, May 23, 1810, and was descended from an old Cornish family of large possessions. He early showed promise of distinction, although his university career at Cambridge was cut short by his sending a challenge to his tutor to fight a duel. He continued his education at the University of Edinburgh and subsequently at Munich. He succeeded to the family baronetcy in 1823. After making the usual tour of Europe he returned home and threw himself in 1831 into the movement for parliamentary reform. Next year, although only just of age, he was elected member of Parliament for East Cornwall. He sat for Leeds from 1837 to 1841. He was the friend of Bentham, James Mill, and George Grote and was regarded as the parliamentary representative of the philosophical radicals. In 1839 he commenced and carried to completion, at a cost of £6000, a reprint of the entire miscellaneous and voluminous writings of Hobbes, which were placed in most of the English university and provincial libraries. The publication did him great disservice in public life, his opponents endeavoring to identify him with the freethinking opinions of Thomas Hobbes in religion as well as with the philosopher's conclusions in favor of despotic government. In 1845 he was elected to Parliament for Southwark, which he continued to represent until his death. He was the first to call attention to the abuses connected with the transportation of criminals

and as chairman of a parliamentary committee brought to light the horrors of the convict system. He pointed out the maladministration of the Colonial Office, explained the true principles of colonial self-government, prepared drafts of constitutions for remote dependencies, and made investigations as to the true and natural relations between the Imperial government and its colonial empire. Molesworth's views, although at first unwelcome to the legislature, were adopted by successive administrations and became part of the colonial policy of Great Britain. In January, 1853, he accepted the office of First Commissioner of Public Works in the administration of the Earl of Aberdeen and in 1855 the post of Secretary of State for the Colonies in that of Viscount Palmerston. Before he could give proof of his administrative capacity he died, Oct. 22, 1855. He established the *London Review*, a new quarterly, in 1835 and afterward purchased the *Westminster Review*, the organ of the philosophical radicals. The two quarterlies being then merged into one, under the title of the *London and Westminster*, Molesworth contributed to it many articles on politics and political economy. The enduring influence of his views was attested by the fact that his speech on the abandonment of the Orange River Territory in 1854 was advanced by the Boer government in 1878 as the chief argument for the British withdrawal from the Transvaal. Consult M. G. Fawcett, *Life of Sir William Molesworth* (London, 1901).

MOLESWORTH, William Nassau (1816–90). An English clergyman and historian. He was born at Millbrook, near Southampton, graduated M.A. at Cambridge in 1842, and entered the English church. He was presented to St. Andrews, Manchester, in 1841 and to St. Clement Spotland, Rochdale, in 1844. He was a strong advocate of coöperation and had an interest in the well-known experiment of coöperation in the industries at Rochdale. Molesworth's most important writings are: *Essay on the French Alliance* (1860); *A History of the Reform Bill of 1832* (1864); *History of England from the Year 1830 to 1874* (3 vols., 1874); *History of the Church of England from 1660* (1882).

MOLFET'TA. An episcopal city in the Province of Bari delle Puglie, Italy, 16 miles northwest of Bari on the Adriatic Sea (Map: Italy, F 4). The city is pleasantly situated, and the old section, surrounded by walls studded with towers, presents a very striking aspect when approached from the sea. It has a twelfth-century Byzantine cathedral, a new cathedral, a lyceum, a Gymnasium, a seminary, a library with 22,000 volumes, a museum, and a theatre. A spacious harbor adds to the attractiveness of the new town and serves to render it an important commercial centre. There are extensive manufactures of flour, vermicelli, soap, bricks, and wine, and a large export trade in oil, almonds, carobs, nitre, and fish. Pop. (commune), 1901, 40,135; 1911, 43,263.

MOLIÈRE, mô'lyâr'. The name assumed by Jean Baptiste Poquelin (1622–73). The greatest dramatist and perhaps the greatest writer of France. Molière was born Jan. 15, 1622, in Paris. His father was a well-to-do tradesman and titular tapissier valet de chambre of the King, an office held later by Molière. Molière's mother died in 1632. He was educated by the Jesuits at the Collège de Clermont (1636–41) and came into touch with some literary men (Luillier, Chapelle, Gassendi). Some say he went to Orléans to study law; others that he studied theology at the Sorbonne; and others still that he went with the court as a minor officer to Narbonne and formed Bohemian associations, among them being the Béjarts, whose daughter, Armande, he afterward (1662) married. In 1643 Molière abandoned his office and family prospects for the stage. After two unsuccessful theatrical ventures he was imprisoned for debt (1645), and in the winter of 1646–47 he became chief of a troupe of players which for 12 years (1647–58) acted in the provinces. In October, 1658, Molière played for the first time before the King, acting in *Nicomède* and *Le docteur amoureux*. In these years of wandering Molière learned the practical side of his profession; as dramatic adapter and composer he learned its literary side. More than all, he learned human nature by observing the provinces in the excited period of the Fronde from the vantage ground of an actor who could view objectively the panorama of high and low life; and at the same time as manager he gained seriousness from responsibility—a seriousness that gives his satire sometimes a tinge of bitterness and always the seal of superiority.

On Molière's return to Paris (1658) he had the prestige of provincial success, and he had written two plays which he thought worthy of preservation, *L'Etourdi* and *Le dépit amoureux*. These were sufficiently superior in their easy, natural dialogue and the alert brilliancy of their style to win for him a court patronage which he never lost and a popularity which assured his troupe a permanent support in Paris. This work was, however, Italian in spirit; but in 1659 Molière discarded, with *Les précieuses ridicules*, the stereotyped pattern, with its stock characters, and inaugurated a new era in comedy with the first dramatic satire on cultured society in France. Not the affected language and manners of the Hôtel de Rambouillet, but those, rather, of its bourgeois imitators, who abounded in Paris, were ridiculed with such infinite good humor that the play has not yet lost its comic force.

As typical of Molière's genius, though of a quite other phase of it, is *Sganarelle* (1660), the first of those gay yet profound farces that still hold the stage because they evoke first a laugh and then a thoughtful smile. He was still feeling his way, and *Don Garcie de Navarre* (1661), a five-act tragi-comedy in verse, marks a relapse to the traditions of the Spanish stage. *L'Ecole des maris* (1661) shows, however, a decided advance. The plot is from Terence, but the aged lover is treated with a pathos and a fidelity to nature that bear the print of genius. From this point onward it becomes necessary to distinguish the work of Molière the born dramatist from that of Molière the theatrical manager and purveyor of court entertainments. He wrote very much in the latter capacity that he would not have written in the former. The financial success and prosperity of his company were also an obligation not to be neglected. To satisfy this he wrote conventional comedies and extravagant farces, and to please the royal taste he composed for festivals at Versailles some 13 semioperatic comedies, in which the text was only a pretext for dancing and singing, wherein high dignitaries of the court sometimes took part. He was distracted, too, by bitter attacks which he condescended occasionally to answer in his farces, though such controversy seems to

have spurred him to his greatest efforts and lent a keener edge to his attacks on hypocrisy and pharisaism.

Les fâcheux (The Bores), a comedy ballet in three acts, acted at Vaux (August, 1661) for Fouquet on the eve of his downfall, illustrates this diversion of genius and is interesting because Louis XIV suggested one of its scenes; *L'Ecole des femmes*, which follows (December, 1662), is an exhibition of Molière's mature art as a satirist aiming at social and moral reformation, and *La critique de l'école des femmes* with *L'Impromptu de Versailles*, which immediately follow this in 1663, are answers to the criticism that it evoked —criticism embittered by Molière's success and given a handle by his marriage (February, 1662) to Armande Béjart. She was probably the sister of an old member of his company, herself an actress, and her indiscretions were a source of constant vexation and jealousy to Molière.

L'Ecole des femmes is the first of Molière's great comedies, the first great serious comedy of French literature. It deals with the part of woman in society and her proper preparation for it and treats both in a spirit more liberal than the France of to-day wholly approves. This alone would have insured violent criticism, but to it was added a bold and contemptuous satire on the prevalent materialistic views of future punishment. The play was denounced, not merely as vulgar and obscene, but as impious, e.g., by Boursault in his *Portrait du peintre*. Boursault was answered by name in the merciless *Impromptu de Versailles*, where, too, the rival company of the Hôtel de Bourgogne were parodied and ridiculed.

This controversy had by no means subsided when Molière, after the trivial *Mariage forcé* (1664) and *La princesse d'élide* (1664), two comedy ballets, provoked redoubled fury by two attacks on hypocrisy, *Tartufe* and *Don Juan*, or *Le festin de Pierre*. Of the former, only three acts were presented in 1664. Jesuits and Jansenists alike winced at it, and five years of persistent effort barely extorted permission to present the masterpiece as a whole. *Don Juan* appeared in February, 1665, and in August the King significantly adopted Molière's troupe as his own. But even his sympathy had its limits, and this appointment was perhaps in the nature of a consolation for the suppression of *Don Juan* in the midst of a prosperous run. The full text of this play is preserved to us only in a copy kept by the chief of police.

While awaiting permission to act *Tartufe* in its entirety, with *Don Juan* forbidden, Molière wrote *L'Amour médecin* (1665), a clever attack on the medical practitioners of his day, and *Le misanthrope* (July, 1666), in which his rivals and critics rightly discerned "a new style of comedy," wherein the constant motive forces of universal human nature are shown modified by the highest refinement to which civilization had yet attained. The easy optimist is set off against the noble pessimist, and a social school for scandal supplies the lighter comedy and offers a pillory for fops and poetasters.

About this time Molière's health seems to have begun to fail. Cold and fatigue brought on a disease of the lungs, and what he says of the distracted and pedantic doctors of his day, when superstition and tradition were struggling with one another and with half-understood fragments of science, lent sad point to the *Médecin malgré lui*, the second of his noteworthy attacks on the quackery of that time. Then follows a period of relaxed activity with only three comedy ballets, *Mélicerte* (1666), *Le pastoral comique* (1667), and *Le Sicilien* (1667), followed by the comparatively insignificant *Amphitryon* (1668), a coarse yet witty adaptation from Plautus. In July of 1668 Molière shows his old self again in *George Dandin*, an immortal type of the man who marries above his social station and suffers the consequences with rueful self-accusation. The story is at least as old as Boccaccio, but Molière's squirarchic Sotenvilles are his creation and an abiding delight.

This little master stroke was followed in September, 1668, by a masterpiece, *L'Avare*, whose central figure, the caricatural Harpagon, is one of Molière's greatest studies of vitiated character. Several lighter pieces followed, first *M. de Pourceaugnac*, a comedy ballet with much raillery at the physicians; then *Les amants magnifiques* (1670), a persiflage of astrological extravagances; then that excellently comic farce, *Le bourgeois gentilhomme* (1670); then *Psyché* (1671), a tragedy ballet, written in collaboration with Corneille and Quinault. The music was by Lulli. Then followed the lively *Fourberies de Scapin* (1671) and finally the *Comtesse d'Escarbagnas*, a study of provincial manners and an attack on financiers, heralding thus Lesage's *Turcaret*. Much greater than any of these are the last legacies to French comedy of the dying Molière, *Les femmes savantes* (1672) and *Le malade imaginaire* (1673). The former recurs to the subject of the *Précieuses ridicules* and with ripest power attacks the admirers of pedantry and the affectations of learning. The latter, primarily a last gibe at physicians, is important for its widening of satiric comedy to include the perversion of childhood.

Le malade imaginaire was first acted Feb. 10, 1673. On the seventeenth Molière undertook the part of the hypochondriac invalid, though suffering from what he called a fluxion. In a fit of coughing he burst a blood vessel on the stage and died at his house a half hour later. His enemies pursued him in death. He was buried half clandestinely. The Archbishop of Paris, thinking Molière's ethics irreconcilable with Christianity, forbade public ceremony, but the command was evaded. The body was laid in St. Joseph's churchyard, but the site of the grave is uncertain.

No dramatist, save perhaps Shakespeare and Aristophanes, ever joined so much wit to so much seriousness as did Molière. There is often a pathetic, even a sad background to his scenes, but this never gets the better of his healthy humor. This humor depends for its effects not so much on plot as on revelation of character, and the satire is directed not so much against the excesses of nature as against those social faults or conventions which disguise or suppress nature. He is more apt to typify phases of character than to present complex natures, and in doing this he gave direction to the development of French comedy for several generations. There is no question that in the analysis of character Shakespeare, even Corneille, is more profound, and they tell a story with more dramatic force, but neither Corneille nor Racine gives so accurately picturesque, so fascinatingly truthful a portrait of French society as we find in the naturalistic, observant humorist, Molière.

Of Molière's *Works* the first edition was by his

friends and fellow actors, La Grange and Vinot (1682); by far the best is Despois and Mesnard's (11 vols., 1873–96). Excellent also are the editions of A. France (7 vols., 1876–91) and Monval (10 vols., 1879–89). One of the first English translations of Molière's *Works* appeared in London in 1748 in 10 volumes. There is a good cheap edition in two volumes with a study by Sainte-Beuve and English translations by Van Laun (6 vols., London, 1875–77), Wall (3 vols., 1876–77, 1891–1901), and K. P. Wormeley (Boston, 1894–97). Waller published an English and French edition (8 vols., Edinburgh, 1907). *Plays from Molière* translated by English dramatists, edited by Henry Morley, appeared in London in 1883. Consult for Molière's style, vocabulary, and usage, C. L. Livet, *Lexique de la langue de Molière* (Paris, 1895–97). Of the *Lives* of Molière that of Mahrenholtz, in German (Heilbronn, 1881), is most comprehensive. Consult also the periodical *Le Molieriste* and the biographies by F. Lotheissen (Frankfort, 1880), Moland (Paris, 1886), Gustave Larroumet (ib., 1886), Paul Mesnard (ib., 1889), Desfeuilles (ib., 1900), and Heinrich Schneegans (Berlin, 1901); the full *Bibliographie molièresque*, by Paul Lacroix (Paris, 1875); L. H. Vincent, *Molière* (Boston, 1902); H. M. Trollope, *Life of Molière* (New York, 1905); H. C. Chatfield-Taylor, *Molière* (ib., 1906); Martinenche, *Molière et la théâtre espagnol* (Paris, 1906); E. Rigal, *Molière* (1910); Brander Matthews, *Molière, his Life and his Works* (New York, 1910); M. I. Wolff, *Molière, der Dichter und sein Werk* (Munich, 1910); D. H. Miles, *Influence of Molière on Restoration Comedy* (New York, 1910); Emile Faguet, *Rousseau contre Molière* (Paris, 1912); also Currier and Gay (comps.), *Catalogue of the Molière Collection in Harvard College Library* (Cambridge, Mass., 1906).

MOLIÈRE, House of. See Comédie Française.

MOLINA, mō-lē′nȧ, Alonso de (c.1510–c.85). A Spanish missionary in Mexico. He was born at Escalona, Spain, early went to Mexico, learned the Aztec language, and was interpreter to the Franciscan friars. He subsequently joined the Franciscan Order and rose to be the superior of Santo Evangelio Province. His publications include translations into Aztec of the catechism and of a confessional manual, and a grammar of that language. His greatest work is his *Vocabulario en lengua castellana y mexicana* (1555; rev. ed., 1571), containing both Spanish-Mexican and Mexican-Spanish parts.

MOLINA, Count of. See Carlos, Don.

MOLINA, Juan Ignazio (1740–1829). An historian of Chile. He was born at Talca, Chile, studied in a Jesuit college at Santiago, taught there and at Bocalemo, and at the age of 20 became librarian at Santiago. He joined the Jesuits and on their expulsion from the country went to Italy in 1767. For several years he was a priest at Imola and in 1774 went to Bologna, where he taught in a private school. His views of the vitality of matter and of the sensibility of metals brought him into disfavor with the Church and he was removed from his professorate for a time. A legacy which Molina received in 1815 was devoted entire to the foundation of a library in Talca. Works: *Compendio di storia del Chile* (1776); *Saggio sulla storia naturale del Chile* (1782); *Saggio della storia civile del Chile* (1787).

MOLINA, Luis (1535–1600). A celebrated Spanish theologian, specially famous in the history of the controversy about divine grace. He was born at Cuenca in New Castile, entered the Jesuit Order at the age of 18, studied and then taught theology and philosophy at the College of Coimbra in Portugal, and was later appointed professor of theology at Evora, where he taught for 20 years. He then returned to Spain to devote himself to literary work and six months before his death was appointed professor of moral theology in a Jesuit school in Madrid. His fame rests mainly upon his celebrated work, *Concordia Liberi Arbitrii cum Grantœ Donis*, first printed in Lisbon in 1588, but not published until the following year. It was the first work of formal scholastic theology produced by the Jesuit Order, as it was the first written by any of them in the nature of a commentary on St. Thomas Aquinas, and scarcely any theological work has ever excited so widespread and lasting a controversy. The latest edition of it is by Lethilelleux (Paris, 1876). (For further details of this controversy, see Molinism.) Among his other works are his commentaries on the first part of the *Summa* of Aquinas (1592) and *De Justitia et Jure* (1592). His complete works were published in seven volumes (Venice, 1614) and with biography and bibliography in five volumes (Cologne, 1733).

MOLINA, Tirso de. A pseudonym of the Spanish dramatist Gabriel Téllez (q.v.).

MOLINARI, mō′lē′nȧ′rē′, Gustave de (1819–1911). A Belgian political economist, born at Liége. He became a physician at Brussels, wrote works on homœopathic medicine, removed to Paris (1843), where he gained some distinction as a radical journalist, but was obliged by the coup d'état (1851) to return to Belgium, and there was appointed professor of political economy in the Musée Royal de l'Industrie Belge (Brussels) and later at Antwerp. In 1857 he went back to Paris, and in 1874 he was elected corresponding member of the Academy of Moral and Political Sciences of the Institute of France. He became editor of the *Journal des Débats* (1867) and of the *Journal des Economistes* (1881). From 1873 to 1875 he traveled and published his observations on the United States in *Lettres sur les Etats-Unis et le Canada* in 1875. He assisted in establishing the journals *L'Economiste Belge* and *La Bourse du Travail* and published numerous works, including *Etudes économiques* (1846); *Questions d'économie politique et de droit public* (2 vols., 1861); *L'Evolution économique du XIXème siècle* (1880); *Le droit de la paix et de la guerre* (1887); *Comment se resoudra la question sociale* (1896); *Questions économiques à l'ordre du jour* (1906); *Théorie de l'évolution* (1908).

MOLINE, mō-lēn′. A city in Rock Island Co., Ill., on the Mississippi and Rock rivers and on the Hennepin Canal, 3 miles east of the county seat, Rock Island, which is opposite Davenport, Iowa, the three cities being closely connected by steam and electric railroads, ferries, and bridges (Map: Illinois, D 2). The railroads entering the city are the Chicago, Milwaukee, and St. Paul, the Chicago, Rock Island, and Pacific, and the Chicago, Burlington, and Quincy. Moline derives excellent water power from the Mississippi, which is here dammed from the shore to the mid-river island,

an advantage which has contributed materially to the city's importance as an industrial centre. Coal is mined in the vicinity, and besides extensive automobile and plow works, there are manufactories of steel, elevator and milling machinery, scales, pianos, organs, furniture, carriages and wagons, steam engines, saw and planing mill products, foundry and machine-shop products, and pumps. A large trade is carried on in machinery, farming implements, grain, lumber, etc. Moline has a high-school library and a large public library, a park system comprising 150 acres, a fine city hall, and a well-equipped city hospital. Of interest in the vicinity are Black Hawk Watch Tower, Campbell's Island, and the Rock Island Arsenal. Moline has adopted the commission form of government. The water works are owned and operated by the municipality. Pop., 1900, 17,248; 1910, 24,199; 1914 (U. S. est.), 26,403; 1920, 30,709.

MOLINET, mô'lē'nā', JEAN (?–1507). A French poet and troubadour. He was a canon of the college church of Valenciennes, chronicler of the house of Burgundy, and librarian to Margaret of Austria, then Regent of the Low Countries. Molinet was one of the "grands rhétoriqueurs"; his poetry is pedantic, heavy, and complicated in rhythm, and his prose full of Latinisms, while both are replete with astonishing puerilities. A volume of his poems was printed in 1531, and his chronicles were published by Buchon in 1828. He also made a prose translation of the *Roman de la rose* (1503).

MO'LINISM. The name commonly applied to the doctrine of Luis Molina on the relation between divine grace and the will of man. The problem which it is meant to solve is as old as the fourth century, when it led to the well-known Pelagian controversy. (See PELAGIANISM.) In reconciling with the freedom of man's will the predestination of the elect to happiness and of the reprobate to punishment, Molina asserts that this predestination is consequent on God's foreknowledge of how man's will would act under any conceivable combination of circumstances, and that therefore it in no way affects the freedom of the particular actions. Accordingly, God gives to all men sufficient grace to enable them to live virtuously and merit happiness; certain individuals freely respond to this grace, while others resist it; God foresees both courses and founds His decrees upon this knowledge. This exposition was assailed in the schools first as a revival of the Pelagian heresy, inasmuch as it appears to place the efficacy of grace in the consent of man's will, and thus to recognize a natural power in man to perform supernatural acts; secondly, as setting aside altogether what the Scriptures represent as the special election of the predestined, by making each individual the arbiter of his own predestination or reprobation. The Dominicans, who were never very friendly to the Jesuits and who felt that this teaching misrepresented that of their great authority, St. Thomas, entered fiercely into controversy; the name of Thomists is generally applied to them and to the other antagonists of Molina. The dispute was brought under the cognizance of the Inquisitor General of Spain, who referred it to Pope Clement VIII. In 1597 he appointed the celebrated Congregatio de Auxiliis Divinæ Gratiæ to consider the entire question; the commission consisted of 11 members, representing different orders and schools. Before the death of Clement VIII in 1605 it had already held 68 sessions, and 17 more were held under Paul V, still without leading to any very definite result. Paul V finally dissolved it after nine years of anxious consultation and in 1611 forbade anything to be printed on either side without license from the Inquisition. The decree was confirmed by Urban VIII in 1625 and again in 1641, with special reference to a new outbreak of controversy occasioned by the publication of the *Augustinus* of Jansenius. The Jesuits had never committed themselves to Molina's doctrine as a whole, and they came gradually to a general support of a modified form of it known as congruism, taught especially by Suarez (q.v.) and Bellarmine (q.v.). While, according to the supporters of this teaching, Molina had placed the effective power of grace altogether in the assent of the free will, Suarez found it rather in the perfect harmony (*congruentia*) of grace with the character, temperament, tendencies, and habits of the individual. The real congruism of Suarez is, however, not so much a departure from the teaching of Molina as a clearer and more precise definition of it. Consult: Gerhard Schneemann, *Die Entstehung und Entwicklung der thomistisch-molinistischen Kontroverse* (Freiburg, 1880); De Régnon, *Bañes et Molina: histoire, doctrines, critique métaphysique* (Paris, 1883); Gayraud, *Thomisme et Molinisme* (ib., 1890).

MOLINO DEL REY, mô-lē'nô dĕl rā'ê (Sp., King's Mill). A series of massive stone buildings about 3000 feet west of Chapultepec (q.v.) and about 3 miles southwest of the city of Mexico; the scene, Sept. 8, 1847, of the most hotly contested battle of the war between the United States and Mexico. At the close of the armistice which followed the battle of Churubusco (see MEXICAN WAR) General Scott determined to destroy a cannon foundry and some military supplies supposed to be located here and on September 7 ordered an attack. Early on the following day General Worth, at the head of about 3100 men, assaulted the buildings, which had been strongly fortified and were then garrisoned by a force of 4000. After suffering severely from the artillery fire the Americans finally drove the Mexicans from their position and held the fortifications for the rest of the day, in spite of a large Mexican reënforcement sent forward by Santa Anna. Of the Mexicans 690 were made prisoners and probably as many as 3000 were killed or wounded. The American loss was heavier, in proportion to the force engaged, than in any other battle during the war, 116 being killed and 671 wounded. The Mexicans, supposing the attack to be part of a movement against Chapultepec (q.v.), regarded the engagement as a victory for their side and still commemorate it as such. Consult: H. H. Bancroft, *History of Mexico*, vol. v (San Francisco, 1885); Wilcox, *History of the Mexican War* (Washington, 1892); R. M. McElroy, *The Winning of the Far West* (New York, 1914).

MOLINOS, mô-lē'nôs, MIGUEL DE (1640–96). A Spanish mystic and leading representative of the doctrines of Quietism. He was born at Patacina in Aragon of noble parents and pursued a course of theological studies at Pampelona and Coimbra, from which university he received the degree of doctor of divinity. Hav-

ing been ordained priest, he acquired a high reputation as a director of conscience and a master of the spiritual life. He went in 1669 to Rome, where he made the same impression and won the friendship of many distinguished people. He declined all preferment and devoted himself entirely to the direction of souls. In 1675 he published an ascetical treatise in Spanish, under the name of *The Spiritual Guide*, which had a wide popularity and was translated into many languages (into English 10 years later; reprinted at Glasgow, 1885). His leading principle was that of habitual abstraction of the mind from sensible objects, with a view to gain, by passive contemplation, not only a profound realization of God's presence, but so perfect a communion with Him as to end in absorption into His essence. The dangers of his doctrine (for an examination of which and its subsequent history, see QUIETISM) were pointed out by not a few, among them the distinguished Jesuit Segneri; but so great was the popularity of Molinos that no decisive steps were taken until, in 1685, he was cited before the Holy Office and submitted to close imprisonment and examination. The Inquisition finally condemned 86 propositions extracted from his writings and in a decree, which was confirmed a few months later by a bull of Pope Innocent XI, required him publicly to abjure them and sentenced him to imprisonment for life. He underwent public penance and was admitted to absolution, but was detained until his death in 1696. Consult John Bigelow, *Molinos the Quietist* (New York, 1882), and J. S. Shorthouse, *Golden Thoughts from the Spiritual Guide of Molinos* (London, 1883).

MOLIQUE, mō'lēk', WILHELM BERNHARD (1802–69). A German violinist and composer, born at Nuremberg. His father was a musician, and the boy studied various instruments, but finally devoted himself to the violin. In 1815 he received some lessons from Spohr and then studied for two years under Rovelli in Munich. In 1820 he succeeded Rovelli as court violinist and after several successful tours became leader of the Royal Band at Stuttgart in 1826. In 1849 he resigned to go to England, in which country he remained till 1866, when he returned to Cannstadt, near Stuttgart, where he died. His compositions, especially his six violin concertos, are still in use.

MOLISE. See ABRUZZI E MOLISE.

MOLITOR, mō'lē'tôr', GABRIEL JEAN JOSEPH, COUNT (1770–1849). A French soldier, born at Hayange (Lorraine). He became a captain of volunteers in 1791, by 1799 had risen to the rank of general of brigade, having fought under Hoche, Massena, and Moreau. Subsequently he was commissioned a general of division and in 1805 fought in the Army of Italy and took part in the battle of Austerlitz. In 1806 he was appointed Governor of Dalmatia and in 1807 Governor of Pomerania, in 1809 contributed to the victory of Wagram, and in 1811–13 was in Holland. He was appointed inspector general of infantry at the Restoration, but received a command in Alsace from Napoleon during the Hundred Days. After the Second Restoration he did not again obtain his offices until 1818. In 1823 he commanded the Second Army Corps in the Spanish expedition and defeated Ballesteros, for which he was commissioned marshal. In 1847 he became commandant of the Invalides and was made Grand Chancellor of the Legion of Honor in 1848.

MOLKO, SOLOMON. See MESSIAH.

MOL'LAH (more properly Ar. *maulā*, Turk. pron. *mevla* or *mullā*). Among the Turks, the title of a superior judge. The mollahs are divided into two classes. Those in the first class exercise jurisdiction over the more important pashaliks. The mollahs of the second class hold office for a lunar month at a time, and their lowest rank is composed of the naibs over the inferior provinces, towns, and villages. The mollah is an expounder of civil, criminal, and canon law; he must, therefore, be a lawyer as well as an ecclesiastic. Under him is the qadi (or kadi), the judge who administers the law, and superior to him are the kadilesker and the mufti (q.v.). They are all, however, subject to the Sheikh ul Islam, who is the supreme mufti. In Persia the office of mollah, who is generally called akhun, is similar to what it is in Turkey. This superior there is the sadr, or chief of the mollahs. In the Mohammedan church the mollahs are beneficed clergy in receipt of some small salary attached to mosques and other pious foundations.

MOLLENDO, môl-yĕn'dō. A coast town in the Department of Arequipa, Peru (Map: Peru, C 7). It is the principal port of south Peru and one of the chief points through which Bolivian trade is carried on. It is connected by railway with the mining districts of the interior of Peru and with Bolivia (La Paz). It exports alpaca wool, quinine, tin, gold, antimony, silver, and copper ores and imports chiefly merchandise for Bolivia. In 1913 its imports amounted to £580,802 and its exports to £1,104,580, giving it second rank in the former and third rank in the latter among the ports of Peru. It is the seat of a United States consular agent. Pop. (est.), 4000.

MÖLLENDORF, mēl'-len-dôrf, RICHARD JOACHIM HEINRICH VON (1724–1816). A Prussian general, born at Lindenberg in Brandenburg. He was in the first and second Silesian wars and was made a captain for bravery at Soor (1746). In the Seven Years' War he rose to the rank of major and received the Order for Merit. At Torgau (1760), where he showed great bravery, he was captured by the Austrians, but he was released in 1761 and was made general a year after. Möllendorf was division commander in the War of the Bavarian Succession (1779), during which he received the Order of the Black Eagle; Governor of Berlin (1783); and commander in 1793 of the troops which put into effect the second partition of Poland, having been made field marshal. He was appointed commander in chief of the Army of the Rhine in 1794. In 1806 he again took the field, was wounded at Auerstädt and captured at Erfurt, but was released by Napoleon, who gave him the cross of the Legion of Honor.

MÖLLENDORF, ULRICH VON WILAMOWITZ-. See WILAMOWITZ-MÖLLENDORF, ULRICH VON.

MOLLENHAUER, môl'en-hou'ĕr, EMIL (1855–). An American orchestra and choral conductor. He was born in Brooklyn and was educated at Russell's Academy, New York. He became a member of Booth's Theatre Orchestra in 1869, first violin of the Theodore Thomas Orchestra in 1871, and a member of the New York and Brooklyn Philharmonic societies. Moving to Boston in 1884, he was a member of

the Boston Symphony Orchestra for four years, and served as conductor of the Germania Orchestra and the Municipal Concerts until 1903. He afterward served as conductor of the Handel and Haydn Society and of the Boston, Lynn, Brockton, Newburyport, and Salem oratorio societies.

MOL'LER, GEORG (1784–1852). A German architect. He was born in Hanover and studied architecture in Karlsruhe and Italy. After his return from Italy he was appointed court architect to the Grand Duke of Hesse. He designed the ducal palace at Wiesbaden, a number of public buildings and private residences at Darmstadt, and the theatre at Mainz. He discovered the original design of the Cologne Cathedral, the two towers of which have been finished in accordance with his published facsimile. His most important publications include *Denkmäler deutscher Baukunst* (1815–31) and *Beiträge zu der Lehre von den Konstruktionen* (1833–44).

MÖLLHAUSEN, mēl'hou-zen, BALDUIN (1825–1905). A German traveler and novelist, born at Bonn. He studied agriculture in Pomerania and spent several years in North America, traveling with Duke Paul of Württemberg (1851) and, at the instance of Humboldt, acting as draftsman to a scientific expedition to the Far West. After a second trip through the western part of the United States, especially Colorado, he wrote *Tagebuch einer Reisē vom Mississippi nach den Küsten der Südsee* (1858) and *Reisen in die Felsengebirge Nordamerikas* (1861). His many novels, mostly on American topics, include: *Die Halbindianer* (1861); *Das Mormonenmädchen* (1864; 3d ed., 1871); *Das Monogramm* (1874); *Die beiden Yachten* (1891); *Fegefeuer in Frappes Wigwam* (1901). His *Illustrierte Romane, Reisen, und Abenteuer* were published in three series and 30 volumes (1906–13).

MOLLIEN, mō'lyăN', NICOLAS FRANÇOIS, COUNT (1758–1850). A French statesman, born in Paris. Early connected with the financial department of the French government, by 1784 he had charge of raising the taxes through the farmers-general. He narrowly escaped with his life during the Revolution, and in 1794 he retired to England for a time. He reëntered the ministry of finance under Gaudin in 1799, and when Napoleon became Emperor in 1804 Mollien was made a member of his Privy Council. Napoleon, who consulted him frequently on financial matters, made him Minister of the Treasury in 1806 and created him Count in 1808. He retired upon the first abdication of Napoleon in 1814, but again took up his ministerial duties during the Hundred Days in 1815. He lived in retirement under the Restoration and in 1819 was made a peer of France. He wrote *Mémoire d'un ministre du trésor publique 1780–1815* (Paris, 4 vols., 1845; new ed., 3 vols., 1898).

MOLLITIES (mŏl-lĭsh'ī-ēz) **OS'SIUM.** See OSTEOMALACIA.

MOLLUS'CA (Lat. nom. pl. neut. of *molluscus*, from *mollis*, soft). One of the chief divisions, or phyla, of the animal kingdom, the study of which is conchology or malacology. The body is bilaterally symmetrical except in snails (Gastropoda), not segmented as in worms and arthropods, but soft, fleshy, and usually protected by a bivalve or univalve shell; moving by a "foot" or muscular creeping disk in gastropods, or, in bivalves, by a tonguelike process; breathing by external gills which are either lamellate or plumelike. A shell is secreted by the fleshy mantle, and in nearly all except the Pelecypoda (q.v.), which are headless, the mouth is armed with an odontophore, an apparatus of muscles and tendons bearing a rasplike lingual ribbon (radula) for sawing or cutting the food or for drilling holes through shells. Many mollusca in their young or larval swimming stages begin as a trochosphere (q.v.), pass through a veliger stage, living at the surface of the sea and gradually sinking to the bottom by gravity as the shell grows larger and heavier. The Mollusca form a highly specialized group, the number of species amounting to upward of 40,000, about one-half of which are living, the other extinct; the earliest known species occur in Cambrian rocks. The group has a wide geographical and bathymetrical range, occurring in all seas from the shore to the abysses of the ocean and also on land and in fresh waters.

A SEGMENTED LARVA. Trochosphere of Chiton.

The affinities of this phylum are not yet settled. Mollusks have evidently descended from some wormlike form, as their larvæ are in some cases segmented and like the trochosphere or trochophore stage of seaworms (Annelida). In the adult segmental organs like those of worms are often present. On the whole they are a grade inferior to the spiders and insects. Mollusks are divided into five classes, i.e., (1) Amphineura (q.v.); (2) Pelecypoda (q.v.) or Lamellibranchiata; (3) Scaphopoda (q.v.); (4) Gastropoda (q.v.); and (5) Cephalopoda (q.v.). The Amphineura comprise a few forms formerly supposed to be worms (Chætoderma and Neomenia). These are primitive types from which, as some authors think, the other mollusks may have descended; all have a ladder-like nervous system, as in Chiton, and are either shell-less or somewhat like that of some Turbellaria (q.v.) and Peripatus (q.v.).

Bibliography. A. H. Cooke, "Molluscs," in *Cambridge Natural History*, vol. iii (New York, 1895); A. F. Arnold, *Sea-Beach at Ebb-Tide* (ib., 1901); A. G. Mayer, *Sea-Shore Life* (ib., 1905); J. E. Rogers, *Shell Book* (ib., 1908); S. P. Woodward, *Manual of the Mollusca* (4th ed., London, 1890); W. H. Dall, *Land and Fresh Water Mollusks* (Washington, 1910). See MOLLUSK.

MOLLUS'CUM CONTA'GIO'SUM. A comparatively rare skin disease occurring chiefly in children of the poorer class and believed to be contagious. Upon the skin are observed waxy-white, semiglobular, smooth elevations varying in size from a pinhead to a pea. The tumors consist of degenerated epithelial cells contained in the globules of hair follicles. The lesions are distributed chiefly upon the face, increase slowly in size and eventually suppurate; or they may be destroyed by incision, after which the contents are squeezed out or curetted away. Ointments containing mercury are sometimes efficacious.

MOL'LUSK. An animal of the phylum Mollusca (q.v.). Mollusks are usually easy to distinguish from other animals on account of their shell, whence they are commonly called shellfish; but the more we study their development

and morphology the more difficult is it to draw a definite line between them and certain worm-like forms. In their early development they travel along apparently the same developmental path as the worms (planarians as well as annelids) and then diverge into a separate path. That the type is a very successful one is proved

TRANSVERSE SECTIONS OF BIVALVE MOLLUSKS.

A clam (*Mya*) and a fresh-water mussel (*Unio*), showing the ligament (*L*) and adductor muscle (*M*).

by the enormous number of species both living and extinct—a success evidently due to the protection afforded them by their shell. In bivalves as well as univalves (Gastropoda) the shell is more or less solid, is composed mainly of carbonate of lime and secreted by the mantle.

A bivalve mollusk like the clam is completely protected by a pair of solid calcareous shells connected by a hinge consisting of a large tooth (in most bivalves there are three teeth) and ligament. The shells are equivalve or with both valves alike, but unlike at each end, the head end being more rounded. On the interior are two muscular impressions, or scars, made by the two adductor muscles. The shell of gastropods is spiral, and that part of the animal contained in the skin is asymmetrical, the twist or torsion being due to gravity or lopping over of the young shell in the larva stage.

As to the most primitive forms we are in the dark. The most characteristic mollusks are the cephalopods. They are bilateral and very highly modified, with a well-marked head containing two highly specialized eyes and two ears. The concentrated ganglia form a brain with cartilaginous protections, while the parts around the mouth are modified to form the tentacles and funnel. The heart and blood vessels are highly specialized.

The "foot" is a modification of the part of the mantle below and behind the mouth; it varies

A BIVALVE MOVING.

A fresh-water mussel (*Unio*) moving through the sand towards the left by means of its extended "foot."

greatly in shape, and is by disuse wanting in oysters and other fixed forms; in the pelecypods or bivalves it is tongue-shaped, and by being filled with water is thrust out between the valves of the shell, so that by means of it the clam can dig deep into the mud, or the fresh-water mussel can plow its way through the sand. In the snails (q.v.) the foot forms a flattened creeping disk extending along the whole length of the body. See illustrations under CONE SHELL; CONCH; ETC.

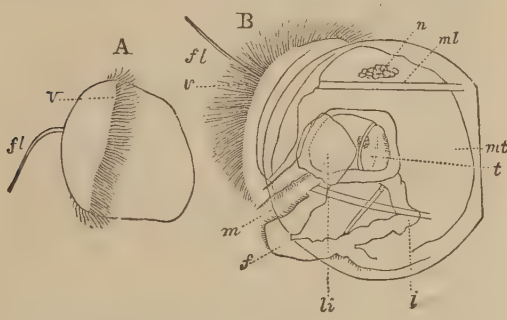
In the clam (q.v.) and most bivalves the hinder end of the body is prolonged into a double siphon, popularly called the head, through the lower division of which enters the water laden with microscopic animals and larvæ, which pass through the mantle cavity into the mouth, which is situated at the opposite end from the siphons. The upper division of the siphon opens out opposite the end of the intestine, which makes two and a half turns in the central or visceral mass, which is composed mostly of the ovaries. The bivalves breathe by a pair of leaflike gills, on each side of the visceral mass between it and the mantle; in the gastropods and cephalopods the gills are plume-like processes, called ctenidia. There is in mollusks a definite heart, which in the primitive forms is three-chambered, i.e., a ventricle and two auricles. The ventricle in the clam and most other bivalves surrounds the intestine; the arteries and veins are well developed; the blood is colorless. Mollusks as a rule differ from other animals in the nervous system, the ganglia, connected by threads (commissures), being grouped around the œsophagus, one pair (the brain) situated above; another, the pedal ganglia, in the foot, and the pair of visceral ganglia, nearer the middle of the body, and innervating the siphon, gills, digestive canal, and heart. See GASTROPODA; CLAM; OYSTER; DECAPODA; and the accompanying illustrations and plates.

Sense organs vary much in situation, number, and size. The eyes of the scallop, which leads an active life, leaping out of the sand and skipping over the surface, are large, highly developed, and numerous, being situated around the edges of the mantle; in those mollusks which burrow (clam) or are fixed (oyster), or live in holes in limestone or coral, etc., the eyes are atrophied. In the squid and other cephalopods they are large and as complicated as those of a fish. The eyes of the land snails are borne at the ends of the tentacles, but in burrowing marine gastropods they may be wanting through disuse, though present in the larvæ.

Our knowledge of the nature of vision in gastropod mollusks has hitherto been very scanty, no observations having been made since those of Lespès in 1851, until experiments by Willem brought out the following results: (1) Snails possess a well-developed power of touch, permitting them to perceive feeble jars of the soil beneath and slight movements of the surrounding media. (2) They see very badly and direct their movements principally by means of the senses of smell and touch. They form a confused image of large objects at an estimated distance of about a centimeter (.40 inch). They clearly distinguish the form of objects only at a distance of one or two millimeters. (3) The fresh-water snails do not have distinct vision at any distance. (4) There does not exist in mollusks a special vision of movements, such as insects possess. In general pulmonate mollusks respond to the action of light, in a degree differing in different species. They have dermatoptic perceptions, which vary much in intensity in different species. Organs of orientation, equilibrium, or hearing are the otocysts. In bivalves a single one is situated in the centre of the foot; in cephalopods they are large and placed one

behind each eye. The otocyst is a primitive form of ear, being a sac containing a minute particle of lime, the otolith. The sense of smell resides in the tentacles of the snail, the olfactory nerve branching out at the end. Also near the visceral ganglia is a group of sense cells (osphradia) supposed to be either olfactory or for testing the purity of the water entering by the respiratory current or, in snails, passing directly into the mantle cavity. Thus the organs of smell appear to be in all the forms represented by groups of specialized cells, which are persistent in nerve supply and position in all mollusks, showing that the sense of smell is all-important. Special organs of taste are as yet unknown in mollusks. Excretory organs are a single pair of highly modified tubes (nephridia) situated one on each side of the body just below the heart. See NERVOUS SYSTEM, EVOLUTION OF THE; EXCRETORY SYSTEM, COMPARATIVE ANATOMY OF THE; and similar titles.

The female ovaries and male reproductive glands are unpaired. The eggs are small and exceedingly numerous, and pass out in bivalves among the folds of the gills, where the young develop. The animal after hatching passes through a gastrula, trochosphere, and veliger stage, the last so called from the two ciliated flaps on each side of the head. Towards the end



LARVAL STAGES OF MOLLUSKS.

A, a trochosphere of the cockle (*Cardium*); *v*, ciliated crown; *fl*, flagellum. *B*, veliger stage, with the shell developing; *v*, velum; *m*, mouth; *li*, liver lobes; *i*, stomach; *i*, intestine; *ml*, mantle; *f*, foot; *ml*, muscle; *n*, nervous ganglion.

of the veliger stage the shell appears, arising from the incipient mantle as a cup-shaped body in both bivalves and univalves, but the hinge and separate valves are indicated very early in the Pelecypoda. In the young *Unio*, or fresh-water mussel, the development history is more condensed. The velum is wanting or vestigial, and the young live between the gills of the parent fastened to each other by their threads (byssus). The shells (glochidium) are triangular, broader than long, with the apex hooked.

Fossil Mollusks. Remains of representatives of all the classes of mollusks occur in the lowest Paleozoic strata, having existed from the Cambrian period down to the present time. As they are so abundant, owing to their preservation as fossils (the shells in the absence of the animal being as a rule useful in classification), the mollusks are of great value as time marks and serve to distinguish the different formations.

The class which occurs fossil in the earliest (Cambrian) strata and concerning which there is no doubt is the Gastropoda. At the base of the Cambrian (Olenellus zone) have been found the shells of such primitive gastropod genera as *Scenella*, *Stenotheca*, *Platyceras*, *Rhaphistoma*, and *Pleurotomaria*. The last-named genus is remarkable for having persisted to the present time, as it is still found at great depths in the Atlantic Ocean. More doubtful are the pteropods of the Cambrian, of the genera *Hyolithes*, *Forellella*, etc., though their shells are much more abundantly found than those of the Gastropoda proper. Of pelecypods the Cambrian forms are obscure and doubtful, the only ones yet found being a tiny little shell (*Modioloides*), and *Fordilla*, which may turn out to be the shell of a crustacean; and this group is comparatively rare even in the Ordovician strata. Of cephalopods the earliest known genus is *Volborthella*, a minute orthoceratite detected in the Lower Cambrian rocks of Finland and Esthonia and in the St. John group, Nova Scotia.

The Cambrian, Ordovician, and Silurian mollusks present (except in generic and specific characters) comparatively unimportant differences from living forms. The earliest known pelecypods were the forerunners of the Nuculidæ; the earliest gastropods were *Pleurotomaria* and allied genera, some still living at great depths; the pteropods were in the main similar to existing forms, while the earliest cephalopods were the Orthoceratites, which are straight, uncoiled nautiloids. In tens of millions of years, therefore, the shelled mollusks have been one of the most numerous and characteristic groups of invertebrates, and became more and more differentiated and abundant in species, genera, and families as time went on; moreover, they are extremely abundant in the Mesozoic and Cenozoic eras, hence they afford unusually favorable data for the study of the phylogeny of both the chief and subordinate groups. This state of things was taken advantage of by Alpheus Hyatt in studies carried on for nearly 40 years, during which he applied the biogenetic law of Fritz Müller and Haeckel to the cephalopods, showing that the life of the individual during its rise and decline displays phenomena correlative with the collective life of the order to which it belongs. In these and similar studies he was followed by Wurtemberger and Neumayr. Their works on fossil cephalopods bear directly on such subjects as quick evolution, the effects of changes of environment, the action of use and disuse, acting throughout numberless generations. The facts gleaned from these mollusks also bear directly on the causes and mode of origin of the different classes, not only of mollusks, but of all other animal groups. The famous researches on the transmutations of the Tertiary shells of Steinheim by Hilgendorf and by Hyatt, those of Neumayr on the successive forms of *Paludina*, and the studies in the variations and evolution of other types by later authors, prove how valuable the shells of mollusks are in such studies.

For the uses by man of mollusks as food or ornament or money, see under CLAM; GASTROPODA; GILL; OYSTER; PEARL; PELECYPODA: SHELL MONEY.

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ed., ib., 1890); and the new edition, by Simroth, of the third volume of Bronn's *Klassen und Ordnungen des Thierreichs* (Leipzig, 1892–94); A. A. Gould, *Invertebrates of Massachusetts* (Boston, 1870); G. W. Tryon, *Manual of Conchology, Structural and Systematic* (17 vols., Philadelphia, 1879–98); Fischer, *Manuel de conchyliologie* (Paris, 1883–88); A. H. Cooke, "The Mollusca," in the *Cambridge Natural History*, vol. iii (New York, 1895); Pelseneer, *Introduction à l'étude des mollusques* (Paris, 1900); Josiah Keep, *West Coast Shells* (San Francisco, 1911). Morphological works of Owen, Gegenbaur, Huxley, Lamarck, Spengel, Lacaze-Duthiers, Bouvier, Bourne, Peck, Ihering, Brooks, Ryder, Hyatt, with monographs by Dall on deep-sea forms and numerous recent and fossil groups, by Binney, Verrill, Bush, Conrad, Kobelt, Pfeiffer, Martens, Reeves, Stearns, Chemnitz, Bourguignant, Pilsbury, and others.

MOLLWITZ, mŏl'vĭts. A village of Prussian Silesia, in the Government of Breslau, 7 miles west of Brieg. To the east of it lies the battlefield where Frederick II of Prussia gained his first victory over the Austrians under Marshal Neipperg, April 10, 1741. The Prussian cavalry was thrown into confusion by the Austrian and put to flight. Frederick left the field at the earnest solicitation of Marshal Schwerin, who saved the day with the infantry after a five hours' battle. The Austrians suffered heavily in killed, wounded, and prisoners.

MOLLY MAGUIRES, mȧ-gwīrz'. A secret criminal order which existed in 1854–77, and possibly afterward, in the anthracite coal mining region of northeastern Pennsylvania. Here 400 collieries employed 60,000 men; Americans, Germans, Welshmen, Englishmen, and Swedes comprised in one-half the number, the remainder being Irish. Among the latter appeared the Molly Maguires, a branch of the Physical Force party of Ireland. The order is alleged to have been affiliated with the Ancient Order of Hibernians. About 1865 the Molly Maguires first became generally known as a dangerous organization. In 1875, having been instrumental in forcing a general strike in the coal regions, it succeeded in obtaining an ascendancy in the councils of the miners, and from that period was prominent in assassinations and other outrages, committed usually on the persons and against the property of justices of the peace, police officers, and mining bosses. Only Irishmen, or the sons of Irishmen, who professed the Catholic faith, were admitted to membership; but by the laws of the Church they could not remain Catholics in good standing. The order was organized in divisions, each having a chief official known as a body master; and there were signs and passwords to enable members to distinguish each other. These signs and passwords were given to the members by the body masters, who received them from the county delegate, who got them from the State delegate, to whom they were furnished by the national delegate or national board in New York City; to the latter they came quarterly from Ireland by the hands of the steward of one of the transatlantic steamships. A central and governing organization known as the Board of Erin held quarterly meetings in England, Scotland, or Ireland. The final exposure, capture, and punishment of the Molly Maguires were largely due to the energy and determination of Franklin B. Gowan, president of the Philadelphia and Reading Coal and Iron Company, through the immediate instrumentality of James McParlan, a Pinkerton detective, who joined the Molly Maguires and became acquainted with their members and the secrets of their organization. Many members of the organization were apprehended, tried, and condemned, and their execution—that of a number of them occurring on the same day—so alarmed the members of the order that it ceased to have any extended influence. Consult: F. P. Dewees, *The Molly Maguires: The Origin, Growth, and Character of the Organization* (Philadelphia, 1877); Allan Pinkerton, *The Molly Maguires and the Detectives* (New York, 1878); J. F. Rhodes, "The Molly Maguires in the Anthracite Coal Region of Pennsylvania," in *American Historical Review*, vol. xv (ib., 1910).

MOL'LYMOKE. One of the many variants of mallemuck. See FULMAR.

MOLMENTI, mŏl-mān'tē, POMPEO GHERARDO (1852–). An Italian scholar, born in Venice. He studied law at Pisa and Padua and subsequently became professor of Italian literature at the Liceo Marco Foscarini. Almost numberless monographs on various aspects of Venetian history led up to his monumental *Storia di Venezia nella vita privata* (Bergamo, 1908–09; Eng. trans. by Brown, Bergamo-New York, 1908). For this work he was made Senator of the Kingdom.

MOLOCH, mō'lŏk. See MOLECH.

MOLOCH, mō'lŏk. An extremely spinose lizard (*Moloch horridus*) of Western and also South Australia, belonging to the family Agamidæ (see AGAMA), and locally known as York devil or mountain devil. It is 5 to 7 inches long, broad and flat, and its thick skin is covered with spines and tubercles much like those of the American horned toad. This skin, which is yellowish, with reddish-brown blotches, is highly hygroscopic, absorbing water like blotting paper. It inhabits sandy districts, is quite harmless, and apparently lives entirely upon ants, which it catches in enormous quantities upon its long, glutinous tongue. Consult Saville Kent, *The Naturalist in Australia.* See Plate with article LIZARD.

MOLOCH, DER. An opera by Schillings (q.v.), first produced in Dresden, Dec. 8, 1906.

MOLOCHATES. See GEMS.

MOLO DI GIRGENTI, mō'lō dē jĕr-jān'tē. The former name of Porto Empedocle (q.v.), a seaport in Sicily.

MOLOKAI, mō'lō-kī. One of the Hawaiian Islands (q.v.).

MOLOKANI, mō'lō-kä'nē (Russ. pl. of *molokanŭ*, from *moloko*, milk). A Russian sect. It is said the name was given them in derision by the orthodox because, unlike the latter, they do not observe fasts. They call themselves Spiritual Christians. They are rationalists, basing doctrine and practice on the Scriptures interpreted by the individual judgment. As a consequence much diversity of opinion prevails among them, a condition which they do not consider reprehensible. They take the early Apostolic Church as depicted in the New Testament for the model of their ecclesiastical organization and have no hierarchy or paid clergy. A presbyter and assistants are chosen from their own number to care for the spiritual and moral interests of the community. At their religious services, held on Sunday in private houses, as they are not allowed to build churches, they

sing psalms, read the Scriptures, and engage in religious conversation. Doctrinal difficulties and questions of interpretation are freely discussed. They regard the sacraments as only symbolical, and lay aside the numerous ceremonies of the Russian church. They reverence Jesus, but do not believe in his divinity, and consider the miraculous portions of the New Testament narrative as fabulous. They have a system of strict supervision of the conduct of individuals. Offenders against morality are admonished in private or public, or excluded from the religious meetings, or even expelled. The Molokani are described as intelligent, well versed in the Scriptures, and in moral conduct and material prosperity decidedly superior to their orthodox neighbors. Because of their principle of private judgment and readiness to change their views, they are easily influenced by adventurers or fanatics; in several instances communities of them have been led astray by such individuals. They have also developed a tendency to break up into different sects, one of which has adopted many of the canons of the Jewish religion; another has made the common ownership of property one of its principles. Their origin is uncertain. A vague tradition says the sect was founded in the sixteenth century by foreign Protestants. Their original seat was in the south. They have been persecuted by the government, and many have been transported to remote parts of the Empire. Their number is estimated at several hundred thousand. Consult A. F. Heard, *The Russian Church and Russian Dissent* (London, 1887).

MOLON, Apollonius. See Apollonius Molon.

MOLOSSINÆ, mŏl'os-sī'nē. See Bat.

MOLTESEN, mŏl-tā'sen, Laust Jevsen (1865–). A Danish Church historian, born at Rodhede. Educated for the ministry at the University of Copenhagen, he wrote *Det kristne Munkevæsens Oprindelse og første Udvikling* (1901) and, as a result of studies in Rome (1894–95), *De Avignonske Pavers Forhold til Danmark* (1896), for which he obtained the doctorate, and *Acta Pontificum Danica, 1316–78*, vol. i (1904). In his field he made large contributions.

MOLT'ING (ME. *mouten, mowten,* from Lat. *mutare,* to change, frequentative of *movere,* to move, Skt. *mīv,* to push), or Ecdysis. The process of periodically shedding the skin, or integument, or its appendages, as hair or feathers; exuviation.

Molting of Plumage in Birds. The change of plumage, or shedding of the old feathers, and their replacement by a new set. The whole plumage, says Dwight, may be renewed or only a part of it. In the case of most of the passerine birds there are two seasons of molts peculiar to the adults—a complete one, in all species, following the breeding season, and an incomplete molt which in certain species precedes the nuptial season. "The first, the postnuptial, restores the worn-out plumage; the second (when it is not suppressed), the prenuptial, adorns birds for the nuptial season." In a few species the prenuptial molt is complete, though usually the wing and tail are not involved, and often the renewal is confined to "a sprinkling of new feathers here and there." Young birds may also molt several times before they even acquire the feathers of adult structure, and many species need to pass through at least two molts besides those of the first summer before the plumage becomes wholly of the pattern and color of the adult. The loss of feathers during the molting process is so compensated for by the renewal of feathers that few birds (the Anatidæ and some other groups excepted) lose either the ability to fly or the protection afforded by their plumage. The feather areas are systematically replaced, the remiges falling out one after another in definite sequence and almost synchronously from each wing. The greater coverts are regularly replaced before the fall of the secondaries beneath them, the lesser coverts before the median, while even in the rows of the lesser coverts an alternation appears to be attempted. On the body the protective sequence is less obvious, but the molt regularly begins at fairly definite points.

The month of August marks the maximum of the molting season, though there is more or less shedding of feathers in nearly every month of the year. A complete molt is accomplished in from four to six weeks, while partial molts require much less time. A resemblance to the shedding of the skin of reptiles is seen in the ecdysis of the scaly feathers of the penguin, which peel off in flakes.

In certain species of European grouse the claws, which grow to an inordinate length in winter, may be partly shed or worn off as spring advances; the white pelican, both sexes of which during the breeding season bear on the ridge of the bill a horny projection, sheds it, so that these excrescences may be "gathered by the bushel." The puffin (q.v.) and some of its allies molt even the horny sheath of the bill, together with the outgrowths over the eyes.

Molt has recently been given a new importance by the researches of Bureau and Beebe. The former has spent many years in the intensive study of the European partridge and red-legged partridge, and has proved that the sequence of molt of the flight and other feathers is invariable. This lends support to the selection by Beebe of the sequence of tail molt as a trenchant character in dividing the Phasianidæ into subfamilies.

Shedding of Horns, etc., by Mammals. In mammals the periodic shedding of the hair or pelage is comparable with molting; as is also the process of annually shedding the antlers, the new antler being larger and consisting of a larger number of branches or tines. In the deer family the horns of the male are deciduous towards spring, while the pronghorn drops its horns in the autumn.

Molting, or Ecdysis, in the Lower Classes. In animals like Crustacea, Myriapoda, insects, and spiders, with a more or less solid exoskeleton, too dense to permit of gradual growth or increase in volume, there must be a periodical casting of the skin, or ecdysis. The same occurs in salamanders, and especially in the scaly reptiles, as snakes and lizards.

In the Crustacea, insects, and similar animals the old skin dies and the new integument is formed by a secretion thrown out by the inner layer of epithelial cells called the hypodermis. On removing the shell of the lobster the hypodermis is seen to be a richly colored, reddish, soft layer. The formation of the new layer of chitin arrests the supply of nourishment to the old skin, so that it dries and hardens and is finally shuffled off. In the crayfish and presumably in the lobster (q.v.), as well as in

lizards and snakes, the casting of the old skin is materially induced and aided by the growth on the surface of the hypodermis of a layer of very fine and equally distributed hairs, called casting hairs, which, by their rigidity and position, mechanically loosen and raise the old skin. These remain as vestiges, forming spikes, ridges, or warts, serving to ornament the crust of crabs or the outer edges of the skin scales of snakes and lizards.

In insects, where casting hairs are exceptional, the loosening and casting of the skin are brought about by the secretion of a fluid by the cells of the hypodermis. This fluid spreads over the whole surface when the cells are still soft and not hardened by exposure to the air. This same fluid, when the pupa extricates itself from the larval skin, extends around the whole pupa and serves to protect it and to glue together the wings, legs, antennæ, etc., in their new position.

The process of molting as seen in caterpillars (e.g., *Telea polyphemus*) is thus. It changes its skin five times before changing to a chrysalis; and the ecdysis occurs at regular periods, i.e., about every 10 days for the first four moltings, while about 20 days elapse between the fourth and fifth casting. The operation usually takes place after 4 P.M. A little before this time it holds its body erect, grasping a leaf with the two pairs of hind legs only; the skin is wrinkled and detached from the body by the fluid previously mentioned; the body now energetically contracts, so that the skin is pulled off and pushed towards the end of the body; the skin thus becomes so stretched that it soon tears just under the neck, and then separates from the head. When this is accomplished the most difficult operation is over, and now the process of casting goes on very rapidly. By repeated contractions the skin is folded towards the tail, like a glove when taken off, and the lining of the spiracles, mouth, fore stomach, and rectum comes out in long filaments. When about one-half of the body appears, the shell still remains like a cap, inclosing the jaws; then the worm, says Trouvelot, as if reminded of this loose skullcap, removes it by rubbing it on a leaf; this done, the worm finally crawls out of its skin, which is attached to the fastening made for the purpose. Directly after the ecdysis the larva increases in size, the head becoming distinctly larger as well as the body, which soon fills out.

The lobster frequently molts after maturity. But in insects which undergo a complete metamorphosis and which have the longest lives the number of molts is greatest. When the number is excessive this seems to be due to some physical cause, such as lack of food combined with low temperature. In caterpillars the number of ecdyses appears to be dependent on climate.

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MOLTKE, mōlt'ke, ADAM WILHELM (1785–1864). A Danish statesman, born at Einsiedelsborg, Fünen. He studied law and in 1831 became Minister of Finance. Upon the death of Christian VIII, in the crisis of 1848, Moltke, who had served two absolute kings, formed a ministry including the most advanced and popular agitators, thus bridging over the gap between the old era and the new. The service he thereby rendered Denmark was very important. His administration introduced the constitution of June 5, 1849, and he also presided over the third constitutional ministry, formed in July, 1851. In 1852 he resigned, disapproving of the decree which sought to change Denmark into a composite, indivisible monarchy. He continued to serve in the Landsting, or Upper House, and from 1855 to 1863 was a member of the consultative Council of State.

MOLTKE, HELMUTH JOHANNES LUDWIG VON (1848–1916). A German general, nephew of the great field marshal Count von Moltke. His brother Friedrich (1852–) was Prussian Minister of the Interior in 1907–10. Helmuth was born at Gersdorf in Mecklenburg-Schwerin, entered the army when he was 20, and served in the Franco-Prussian War as a lieutenant. He was at the Kriegsakademie in 1876–79, became captain with the general staff in 1880, and in 1882–91 was second adjutant to his uncle. Thereafter his advance was rapid, and in 1906 he became chief of the Imperial general staff, receiving the rank of general of infantry in the same year. When war broke out in 1914 (see WAR IN EUROPE) his health was poor, and after repeated reports of his removal he was definitely superseded in December by Gen. Erich von Falkenhayn, former Minister of War, who for some weeks had been taking his place. Moltke's removal was supposed by many to have resulted from an unwillingness to accept the Kaiser's plan of campaign.

MOLTKE, HELMUTH KARL BERNHARD, COUNT VON (1800–91). A famous Prussian general. He was born at Parchim, Mecklenburg-Schwerin, Oct. 26, 1800, of an old noble family. In 1811 he was sent to the military academy at Copenhagen, and in 1819 became an officer in the Danish service, but in 1822 entered the Prussian army as second lieutenant. From 1823 to 1826 he studied at the military college at Berlin. In 1832 he served on the general staff, and was several times promoted, attaining the rank of captain in 1835. In the same year he went to the Orient and, with the sanction of the Prussian authorities, took a prominent part in the reorganization of the Turkish army initiated by Mahmud II. In 1839 Moltke returned to Prussia. His promotion was fairly rapid. In 1856 he was created major general and in 1858 he became chief of the general staff. In 1859 he was appointed lieutenant general. While on the general staff Moltke continued that remarkable development of the Prussian army which had been begun by Scharnhorst in 1807. Staff

schools were established, and Moltke, who was himself a lucid lecturer, succeeded in inspiring his officers with an enthusiastic interest in their work. A constant interchange of line and staff duties kept the staff in touch with the actual discipline, drill, and handling of troops and the business administration of each corps and division. Moreover, plans for possible campaigns and topographical surveys of neighboring countries were made in the minutest details.

After serving for a year as adjutant to Prince Henry of Prussia in Rome, Von Moltke returned to Germany and rose rapidly in the military ranks until in 1848 he became a member of the general staff and in 1855 first adjutant to Prince Frederick William. In 1857 he was appointed chief of the general staff of the army and labored to perfect the military organization. The first test of the system came in 1864 with the war of Prussia and Austria against Denmark. The full revelation of the Prussian efficiency was brought about by the Seven Weeks' War between Prussia and Austria in 1866. Europe was surprised to see a campaign so rapid and successful directed, so to say, from the seat of government, for Moltke had not gone to the front until shortly before the end of the war. The great strategist received from his King, William I, the Order of the Black Eagle, and from the Prussian Landtag 50,000 marks. The Franco-German War of 1870–71 was the crowning triumph of Moltke's career. The war had been long expected, and the marvelous readiness of the Prussian army was in striking contrast to the disorder existing in French military affairs. Moltke did not himself enter France until the war had already been strategically decided, but it was his plan that had been carried out with an astounding certainty and precision. He was rewarded in September, 1871, by promotion to the rank of field marshal and a large grant of money. The title of Count had been conferred upon him in 1870. Other European states also showered honors upon him. On Aug. 9, 1888, Moltke retired from active service. In 1841 he had married a stepdaughter of his sister, who died in 1868.

Moltke's writings on military matters, which include valuable essays on Turkish affairs, have all been published in various editions, the best being *Gesammelte Schriften und Denkwürdigkeiten* (8 vols., Berlin, 1892). English translations have been made under the following titles: *The Russians in Bulgaria and Rumelia in 1828 and 1829* (London, 1854); *Field Marshal Count Moltke's Letters from Russia* (New York, 1878); *The Franco-German War of 1870–71* (ib., 1892; new ed., 1901); *Moltke: His Life and Character, Sketched in Journals, Letters, Memoirs, a Novel, and Autobiographical Notes* (ib., 1892); *Letters of Field Marshal Count Helmuth von Moltke to his Mother and his Brothers* (ib., 1892); *Essays, Speeches, and Memoirs of Field Marshal Count Helmuth von Moltke* (2 vols., London, 1893); *Field Marshal Count Helmuth von Moltke as a Correspondent* (ib., 1893); *Moltke's Letters to his Wife and Other Relatives* (2 vols., ib., 1896); *Moltke's Tactical Problems from 1858 to 1882*, edited by the Prussian general staff (ib., 1899).

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MOLUC'CAS, or SPICE ISLANDS. An archipelago constituting part of the Dutch possessions in the East Indies and comprising most of the islands situated between Celebes and New Guinea and between the Philippines and the Timor Archipelago (Map: East India Islands, G 5, 6). The group lies on both sides of the equator. Its aggregate area is 21,516 square miles. It is divided into the northern and southern Moluccas. The former comprise the islands of Gilolo, the Obi group, Ternate, Tidore, and Morotai, with the adjacent islets; while the latter take in the islands of Ceram, Buru, and the Kei, Aru, and Banda groups with their surrounding islands. Certain authorities include other groups of adjacent islands under this general title, bringing the area thus included up to 43,864 square miles. In geological structure the Moluccas resemble the island of Celebes, being mostly composed of Archæan or Paleozoic rocks. The highest point is Mount Nusa Heli in Ceram, 10,000 feet high. The Moluccas lie in the line of volcanic activity which extends from the Sunda Islands northward through the Philippines and Japan. Many of the smaller islands are of volcanic formation throughout, and on Ternate, as well as in Gilolo, Morotai, Banda, and Tidore, there are active cones. The climate is hot, but as a rule not unhealthful. The Moluccas are not so well watered or rich in vegetation as the more westerly islands in the Dutch East Indies, but the production of spices, from which they derive their name, is very large. The pepper, nutmeg trees, and various other spice-producing plants are here indigenous. Coffee, cacao, tobacco, indigo, and rice are cultivated with success, and the pith of the sago palm is the staple food of the natives. In regard to the fauna, the islands are in the zone of contact of the Indonesian with the Australasian region. Besides species of marsupials there are wild hogs, civet cats, and a species of goats. Birds of bright plumage abound in the forests. Among insects the butterflies are remarkable for their size and the brilliancy of their colors. Sulphur is the most important mineral of the islands, but petroleum, porcelain clay, tin, and coal are also found.

Industry is chiefly confined to the raising of spices and food products. While the clove tree and the nutmeg occur in all the islands, clove culture is carried on especially in Amboina and the Uliassers, and the cultivation of the nutmeg in the Banda Islands. This is due mainly to the fact that the Dutch, in their desire to retain their supremacy in the spice market, restricted the cultivation of these spices to the above-mentioned islands until 1863, when the restriction was taken off. The trade of the group is centred chiefly around Amboina and Ternate. The exports consist mostly of cloves and other spices, sago, and coconuts. Administratively the archipelago is divided into the two residencies of Ternate and Amboina. The chief city as well as the commercial centre is Amboina (q.v.), on the island of the same name. The population is estimated at 450,000, and consists chiefly of Alfurese (q.v.) and Malays, the former being

frequently considered the original inhabitants, and found especially in the interior of the islands. The number of foreigners is insignificant.

The Moluccas were discovered by the Portuguese in 1512 and were formally taken possession of by them in 1521. They were soon, however, taken by the Dutch, who started the cultivation of spices here. In 1605 Amboina was made the chief station of the Dutch East India Company, which also built forts on several other islands. With the annexation of the Moluccas to the Dutch possessions in the East Indies the government also acquired a part of New Guinea and Celebes and a few other islands which constituted parts of the former vast possessions of the sultans of Ternate and Tidore. In 1867 the political unity of the islands was dissolved.

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MOLUCHE, mō-lōō'chā (Western people). An important tribe of Araucan stock (q.v.), residing on the northern head streams of the Limay River in southwestern Argentina. They are distinguished for their light complexion and regular features. Unlike most of their kindred, they are sedentary and industrial, having large herds of sheep and extensive apple orchards, whence they are sometimes called by the Spaniards Manzaneros, or apple people.

MO'LY (Lat., from Gk. *μῶλυ*). A magic herb with a black root and flower white as milk, given by Hermes to Odysseus as a protection against the magic of Circe (q.v.). (Cf. *Odyssey*, x, 305 ff.) Some scholars have identified the Homeric moly with hellebore (q.v.), much used in ancient times as a remedy against madness. In later writers the word is applied to garlic.

MOLYB'DENITE (from *molybdena*, from Lat. *molybdæna*, from Gk. *μολύβδαινα*, *molybdaina*, galena). A mineral, molybdenum disulphide, that crystallizes in the hexagonal system in soft, flexible, nonelastic plates, has a metallic lustre, and is of a bluish-gray color. It occurs in granite, gneiss, limestone, and other crystalline rocks and is found at various localities in Sweden, Norway, Finland, Saxony, France, Italy, Canada, and in the United States at various points in New England, New York, Pennsylvania, and California. It was long confounded with certain compounds of lead and of antimony until about 1778, when Scheele clearly showed that it was quite distinct from those substances. Molybdenite is the chief source of the molybdenum salts which are of considerable importance in chemical analysis and in the chemical industries such as dyeing, coloring pottery, etc. See MOLYBDENUM.

MOLYB'DENUM (Neo-Lat., from Lat. *molybdæna*, galena or litharge). A metallic element isolated by Hjelm in 1790, after Scheele had transformed the known sulphide of molybdenum into molybdic acid in 1778. The name was applied by the ancients to various substances containing lead. Subsequently it was applied to graphite and the mineral molybdenite. Molybdenum is not found native, but in combination as the sulphide (*molybdenite*), which is the source of the commercial supply of molybdenum, as the oxide (*molybdite*), with lead (*wulfenite*), and with cobalt (*pateraite*). In smaller quantities it is also found in other minerals. The metal itself is obtained by heating its chloride or trioxide to redness in a current of hydrogen. Molybdenum (symbol, Mo; atomic weight, 96) is a silver-white metal with a specific gravity of 8.6 and a melting point above that of platinum and but slightly below that of tungsten. It combines with oxygen to form the following four oxides: a monoxide (MoO), a sesquioxide (Mo_2O_3), a dioxide (MoO_2), and a trioxide (MoO_3), of which the trioxide is the only important commercial compound of molybdenum. The trioxide, usually called molybdic acid, combines with bases to form molybdates, of which the ammonium molybdate, $(NH_4)_2MoO_4$, is of value as a reagent for phosphoric acid. Molybdenum itself is used for hardening steel, molybdenum steel being even better than tungsten steel for the manufacture of tools. For this purpose it is used either as comparatively pure molybdenum or in the form of ferromolybdenum, an alloy made in the electric furnace and containing from 50 to 85 per cent of molybdenum, from 10 to 50 per cent of iron, small percentages of carbon, and very small quantities of silicon, sulphur, and phosphorus. See MOLYBDENITE.

MOLYN, mō-lin', PIETER DE (c.1595–1661). A Dutch landscape and genre painter and etcher, born in London. A pupil of Frans Hals at Haarlem, he was received into the guild there in 1616. Besides landscapes in the style of Jan van Goyen, enlivened with biblical and other accessory figures or animals, he painted village festivals, military scenes, and the like with a broad touch and warm, forcible coloring. His pictures are very rare. The Brunswick Gallery contains a fine landscape of "Sandhills with Group of Trees" (1626) and the Berlin Museum a "Ravine with Figures" of very powerful effect. In the Museum at Brussels may be seen a "Night Festival" (1625), at Haarlem the "Sacking of a Village" (1630), and in the Metropolitan Museum, New York, a "Cottage with Landscape." Several of the pictures attributed to him in other galleries are probably by Pieter Mulier (q.v.).

MOLYN, PIETER DE, THE YOUNGER. See MULIER.

MOLYNEUX, mūl'i-nuks, WILLIAM (1656–98). An Irish philosopher and author, born in Dublin. He graduated at Trinity College, Dublin, in 1675; studied law at the Middle Temple, London, in 1675–78; published a translation of Descartes's *Meditationes de Prima Philosophia* in 1680; and in 1683 assisted in founding the Dublin Philosophical Society, of which the Royal Irish Academy was successor. In 1689–90, owing to the disturbances attending Tyrconnel's government, he resided in Chester, England, where he wrote the major part of his *Dioptrica Nova: A Treatise of Dioptrics* (1692), which long continued to be the most important work on the subject. From 1692 until his death he represented Dublin University in the Irish Parliament. He published in 1698 his *Case of Ireland Stated, in Relation to its Being Bound by Acts of Parliament Made in England* (1698),

his best-known work, in which he sought to prove the independence of the Irish Parliament and which evoked much discussion. His further writings include *Sciothericum Telescopicum* (1686), describing "a new contrivance of adapting a telescope to a horizontal dial."

MOLZA, mōl'tsȧ, Francesco Maria (1489–1544). An Italian poet, born at Modena. He went as a youth to Rome, and after living for five years in Modena, returned to Rome in 1516. From this time he led a life of reckless dissipation. At times he was in the service of Cardinal Ippolito de' Medici and again in that of Cardinal Alessandro Farnese, but he wrote much graceful verse in the meantime. The most celebrated of his poems is the *Ninfa Tiberina*, composed in honor of Faustina Mancini. He wrote also sonnets, burlesques, romances, elegies, and epigrams. Consult *Poesie volgari e latine* (Parma, 1747–54). His granddaughter, Tarquinia Molza (1542–1607), was also a poet. Several of her poems have been printed with the works of her grandfather.

MOMBASA, mŏm-bȧs'ȧ, or **MOMBAZ.** The chief seaport town of the British East Africa Protectorate, situated on a small coral island off the coast in lat. 4° 3′ S. and long. 39° 43′ E., about 150 miles north of Zanzibar Island (Map: Africa, J 5). The shores of the island are rocky and abrupt; the island is connected with the mainland by a railway line. Mombasa is an important commercial centre, a naval coaling station, and the terminus of the Uganda Railway. It has a sheltered but shallow harbor with an iron pier and a stone wharf. There are a number of ancient buildings which testify to the ancient prosperity of the place, but the houses in the native quarter generally are poorly built. The chief object of interest is an extensive fort on a scarped rock built in 1596 by the Portuguese and restored in 1635. To the south of the fort is an attractive European quarter containing the bungalows of the official and commercial classes, the Anglican cathedral, the Roman Catholic church, three well-equipped hotels, and numerous European shops. Near the fort are the buildings of the High Court of British East Africa, of which Mombasa is the seat, the European Club, and the White Hospital. On the other side of the island, some 2 miles west of Mombasa, is Kilindini, now the chief port of entry for British East Africa and Uganda. It has the deepest landlocked harbor on the east coast of Africa, and vessels of the largest tonnage can enter safely. It is connected with Mombasa by a trolley line and contains the cable station of the Eastern Telegraph Company and numerous warehouses situated near the wharf. Mombasa has a thriving population both native and white and contains a number of East Indians, for whom special schools are provided by the government, which also furnishes an elementary school for the children of European parents. Mombasa was visited by Vasco da Gama in 1497 and held by the Portuguese during the greater part of the period from 1529 to 1698, when it appears to have become independent. The English held it from 1824 to 1826, after which it passed to Zanzibar and was ceded in 1891 to the Imperial British East Africa Company. At present it is under the direct administration of the crown. Pop., 1913, about 30,000, mainly Swahili, but containing some 4600 East Indians and 267 Europeans. Consult *Handbook for East Africa* (Mombasa) and Lord Cranworth, *A Colony in the Making* (London, 1912).

MOMBERT, mōm'bĕrt, Jacob Isidor (1829–1913). An American Protestant Episcopal clergyman and scholar. He was born at Cassel, Germany, studied in England, at Leipzig, and at Heidelberg; was ordained priest in 1857; and afterward held charges in Quebec, Lancaster (Pa.), Dresden (Germany), Jersey City and Passaic (N. J.). After 1882 he devoted himself largely to study and writing. He translated Tholuck's *Commentary on the Psalms* and wrote: *Faith Victorious* (1882), a life of Archdeacon Johann Ebel of Königsberg; *Handbook of the English Versions of the Bible* (1883; new ed., 1907); *Great Lives* (1886); *Life of Charles the Great* (1889); *Short History of the Crusades* (1894); *Raphael's Sistine Madonna* (1895). In 1884 he brought out a verbatim reprint of the edition of 1530 of William Tyndale's *Five Books of Moses*, with various collations and prolegomena.

MO'MENT (Fr. *moment*, from Lat. *momentum*, movement, alteration, particle sufficient to turn the scales, moment, from *movere*, to move, Skt. *mīv*, to push). When portions of matter are in rotation about an axis those physical quantities which are used to describe motion of translation—e.g., force, momentum, inertia, or mass—cease to be useful in expressing the properties of the angular motion. Analogous expressions, however, can be found which are called moment of force, moment of momentum, moment of inertia—all with reference to the axis of rotation—which play the same part in the equations of rotation as do force, momentum, and mass in translation. The moment of a force about an axis is the product of the numerical value of the force by the perpendicular distance from the axis to the line of action of the force. The moment of momentum of a particle about the axis is the product of the momentum by the perpendicular distance from the axis to the direction of the velocity of the particle. (If the particle forms part of a rigid body rotating about a fixed axis, the moment of momentum equals the product of the moment of inertia and the angular velocity.) The moment of inertia of a rigid body about an axis is the summation of a series of terms, $m_1r_1^2 + m_2r_2^2 + \ldots$ (or Σmr^2), where m_1 is the mass of a particle of the body and r_1 is its distance from the axis, etc. See Mechanics.

MOMEN'TUM (Lat., movement, alteration, particle sufficient to turn the scales, moment), or Quantity of Motion. The product of the mass of a moving particle and its linear velocity. (It is a vector quantity.) Both terms were used by Galileo; the latter by Newton. It is a fundamental principle of mechanics (q.v.) that the numerical value of the influence of any external body in changing the motion of a moving particle is the rate of change of momentum with reference to the time, or the change in one second if the change is uniform. The total change of momentum in any time equals the impulse of the external force, or the product of the force and the interval of time. If a bullet enters a target, the *time* required for it to come to rest depends upon its *momentum;* but the *distance* it enters, upon its *kinetic energy.* Thus, to produce a powerful blow a great momentum (mv) is required; but to do destructive damage, great kinetic energy ($\frac{1}{2}mv^2$). If a system of bodies is moving free from external

influence, the geometrical sum of the linear momenta of all the bodies of the system remains unchanged regardless of how the momenta of the individual bodies are altered by impacts, explosions, etc. This is called the principle of the conservation of linear momentum. (By geometrical sum is meant the process of adding geometrically the lines which indicate the momenta of the individual bodies of the system.)

If a rigid body is rotating about a fixed axis, the product of its moment of inertia about this axis and its angular velocity is called its angular momentum, and it plays the same part in motion of rotation that linear momentum does in translation. See MECHANICS.

MOMIERS, mô'myâ' (Fr., mummers). The name given in derision to a class of evangelical Protestants of Switzerland and adjacent parts of Germany and France which sprang up about 1817 and whose members exhibited an uncommon degree of fervor in their religious services. They charged the national church with apostasy from the reformed faith, especially by denying the divinity of Christ. This subjected them to opposition, restraint, and fines. Among those who belonged to the Momiers or sympathized with them were César Malan, Louis Gaussen, Merle d'Aubigné, and F. Monod (qq.v.). Out of this sect sprang the French society styled the Evangelical Society for the Conversion of Roman Catholics, and the Free Church of Switzerland. Consult: *Geschichte der Momiers* (Basel, 1825); Von der Goltz, *Die reformirte Kirche Genfs im 19. Jahrhundert* (ib., 1864); Chenevière, *Quelques mots sur la Genève religieuse au XIXème siècle, de M. le Baron de Goltz* (Geneva, 1863).

MOMMSEN, môm'zen, THEODOR (1817–1903). An eminent German classical scholar. He was born Nov. 30, 1817, at Garding in Schleswig, where his father was a pastor. From 1838 to 1843 he studied at the University of Kiel, devoting himself especially to legal and historical subjects. From 1844 to 1847 he traveled and studied in Italy and France, giving special attention to inscriptions. In 1848 he became editor of the *Schleswigholsteinische Zeitung* at Rendsburg, and in the autumn of the same year was called to Leipzig as professor extraordinarius of law. Two years later, however, having been removed for political reasons, he withdrew to Switzerland, where he became professor of Roman law at the University of Zurich in 1852. After two years he was called to a similar position at Breslau and from 1858 he was professor of ancient history at Berlin. From 1874 to 1895 he was permanent secretary of the Berlin Royal Academy of Sciences. He also served as deputy in the Prussian Parliament from 1873 to 1882 and was a powerful factor in all liberal movements. Mommsen's literary activity began in 1843 with his famous monograph, *De Collegiis et Sodaliciis Romanorum*, and from that time he continued to make most important contributions to almost every field of classical learning. In 1902 he was awarded the Nobel prize for literature. His greatest works are: *Die unteritalischen Dialekte* (1850); *Römische Geschichte* (1854–56); vols. i–iii, in 8th ed., 1888; Eng. trans., New York, 1894), unquestionably one of the most masterly histories ever written; *Römische Chronologie* (2d ed., 1859); *Die Geschichte des römischen Münzwesens* (1860); *Römisches Staatsrecht* (3d ed., 1887–88); *Römisches Strafrecht* (1899); *The Provinces of the Roman Empire* (1885; 5th ed., 1894; Eng. trans. by W. P. Dickson, 1886, revised by F. Haverfield, 1909). Mommsen more than any other man became the founder of modern Latin epigraphy. (See INSCRIPTIONS, *Latin.*) By his publication of the volume *Inscriptiones Regni Neapolitani Latinæ* (1852) and his *Inscriptiones Confœderationis Helveticæ Latinæ* (1854) he set the model which has been followed in the great collection of Latin inscriptions, the *Corpus Inscriptionum Latinarum*, which has been published at the expense of the Berlin Academy since 1863. Of this great work Mommsen himself edited vols. i, iii, viii, and ix. He published also a large number of epigraphical works, one of the most important of which is the *Monumentum Ancyranum*, with extensive commentary (2d ed., 1883. This work deals with the great inscription described under ANGORA). He also edited many Latin works, including the *Digest*, the *Edict* of Diocletian (1893), and the *Codex Theodosianus* (1904–05), and served as coeditor of the *Monumenta Germaniæ Historica*. Many of his separate papers were gathered together in two volumes entitled *Römische Forschungen* (1863–79). Since his death his *Gesammelte Schriften* have been published in 8 volumes. For a full list of his publications up to 1887, consult Zangemeister, *Theodor Mommsen als Schriftsteller* (Heidelberg, 1887; expanded by Jacobs, 1905). See also C. Wachsmuth, *Worte zum Gedächtniss an Theodor Mommsen* (Leipzig, 1904), and J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

Two of Theodor Mommsen's brothers were recognized scholars in special fields. TYCHO (1819–1900) was born at Garding, studied at Kiel, and was engaged in educative work until 1885, when he retired. He published a critical edition of Pindar (1864) and other works on the Greek poet. AUGUST, who was born at Oldesloe, and studied at Kiel, was also engaged in educational work, and published several volumes relating to Greek and Roman chronology.

MOMOR'DICA (Neo-Lat., from Lat. *mordere*, to bite; so called because the seeds look as if bitten). A genus of the family Cucurbitaceæ. *Momordica balsamina*, a native of southern Europe and of the East, used to cover arbors, produces a curious, oblong, much-warted fruit, called the balsam apple, which, when green, is infused in oil to form a vulnerary much esteemed in Syria and some other countries. The large, red, thorny fruit of *Momordica cochinchinensis*, called golkakra in India, is there used for food. *Momordica charantia*, a native of Asia and Africa, grown as an ornamental in the United States, is noted for its peculiarly sculptured seeds, the pulp surrounding which is eaten by the Chinese. *Momordica involucrata* is also cultivated as an ornamental.

MOMOSTENANGO, mō'mōs-tā-nän'gō. A town of the Department of Totonicapan, Guatemala, 60 miles northwest of the city of Guatemala. It is situated on a high plateau in the midst of an important agricultural region producing, rice, corn, and beans. Its inhabitants, chiefly Indians, are also engaged in weaving woolen cloth. Pop., about 18,000.

MO'MOTOM'BO. A volcano in Central America, situated on the northwest shore of Lake Managua in Nicaragua (Map: Central America, D 4). Its height is 6124 feet. It is still active; its last great eruption occurred in 1852.

MOMPÓS, môm'pōs, or **MOMPOX.** A town

of the Department of Bolívar, Colombia, situated on the Magdalena, 110 miles southeast of Cartagena (Map: Colombia, C 2). It has two colleges and several elementary schools. It was formerly an important port, but the river at this point is no longer navigable. The chief occupation of the inhabitants is the manufacture of jewelry, tools, and instruments. Pop. 1912, 14,703.

MO'MUS (Gk. Μῶμος, *Mōmos*, ridicule). To the Greeks the personification of mocking censure. In Hesiod, *Theogony*, 214, he is the offspring of Night, and in the lost epic poem, *Cypria* (q.v.), he seems to have suggested to Zeus the marriage of Thetis and the birth of a fair daughter, which would together bring about the Trojan War. His story was chosen for satyr dramas, and his name became proverbial for a carping and mocking critic. In Lucian and his contemporaries Momus is more prominent than in the earlier writers, and criticizes all the gods for their defects, even to the shoes of Aphrodite, who was otherwise faultless. For this Zeus finally drove him out of heaven. Consult Lucian, *Hermotimus*, 20, and *Deorum Concilium*.

MONA, mō'nȧ. An opera by H. Parker (q.v.), first produced in New York, March 14, 1912.

MO'NA. The name given by the Romans to an island invaded by Suetonius Paulinus in 60 A.D., and conquered by Agricola in 79 A.D. The island is commonly identified with Anglesey (q.v.), though on that island only meagre traces of Roman occupation have been found. The name Mona was sometimes applied by error, rather to the Isle of Man (q.v.).

MONACA, mŏn'*a*-ka. A borough in Beaver Co., Pa., 25 miles west of Pittsburgh, on the Ohio River and on the Pittsburgh and Lake Erie Railroad (Map: Pennsylvania, A 5). There are manufactories of enameled porcelain ware, glass, tile, tubing, drawn steel and wire, tools, etc. Fire clay is found in large quantities in the vicinity. Thiel College was founded here in 1866 and was removed to Greenville five years later. Monaca owns its water works. Pop., 1900, 2008; 1910, 3376.

MONACHISM, mŏn'ȧ-kĭz'm. See MONASTICISM.

MONACI, mō-nä'chē, ERNESTO (1844–). An Italian scholar in Romance philology, born at Soriano (Province of Rome). He studied the Romance languages and became professor of Romance philology at the University of Rome in 1876. The *Rivista di Filologia*, which he founded in 1872, with Stengel and Manzoni, ceased publication in 1876, but the *Giornale di Filologia Romanza* (1878–84) was virtually a continuation of it. Monaci published detached essays along the same line in the *Studi di Filologia Romanza* and under the following titles: *Uffizi drammatici dei disciplinati dell' Umbria*, in the *Rivista di Filologia* (1872); *Il canzoniere portoghese della Biblioteca Vaticana* (1875); *Il canzoniere portoghese Brancuti-Colocci* (1875–80); *Il canzoniere chigiano* (1878), with Molteni; *Testi antichi provenzali* (1889); *Facsimili di antichi manoscritti per uso delle scuole di filologia neolatina* (1881, 1892); *Crestomazia italiana dei primi secoli con prospetto delle flessioni grammaticali e glossario* (1889, 1912); *Sull' antica parafrasi dei disticha de moribus verseggiata da un rimatore anagnino* (1899). He also edited the *Studi romanzi* of the Società Filologica Romana (10 vols., 1903–13).

MONACO, mŏn'ȧ-kō. An independent Italian principality under the protection of the French government since 1860, and the smallest sovereign state of Europe, bounded by the Mediterranean and the French Department of Alpes-Maritimes (Map: France, S., M 5). Its area is about 8 square miles and the principality practically consists of the capital, Monaco, Monte Carlo (q.v.), and the village of Condamine, between the two towns. It is in a mountainous country, renowned for its picturesque scenery. The chief exports are oil, oranges, lemons, perfumeries, liquors, and artistic potteries, although its inhabitants are engaged chiefly in providing accommodations for tourists. In 1913 there were 1,692,258 visitors. The government of the principality is that of a constitutional hereditary monarchy. In 1911 Prince Albert granted a constitution, which established a National Council of 21 members. They are elected for four years by universal suffrage with *scrutin de liste*. The government is carried on by the Prince with the aid of a cabinet and a Council of State. There is a court of first instance and a court of justices of the peace, but no jail, all prisoners being sent to France. The judges are appointed by the Prince, mostly from members of judicial bodies in France, and the French Code has been adopted with some modifications by the principality. The police force consists of 4 officers and 82 gendarmes. There is no army and little taxation, the revenue being derived almost entirely from the profits which are received from the famous gaming tables at Monte Carlo. The principality forms a Roman Catholic bishopric, and the Roman Catholic church is recognized and supported by the state. Pop., 1908, 19,121; 1913, 22,956. The population of Monte Carlo is about 10,000.

Monaco was conferred on a member of the Genoese house of Grimaldi in 968. In 1450 the principality passed under the protection of Aragon, but, dissatisfied with the Spanish rule, it came under the protection of France in 1641. In 1731 the last male member of the house of Grimaldi was succeeded by his daughter Louise Hippolyte. She had married James de Goyon Matignon in 1715. Upon her death he acceded to the throne and added the name Grimaldi to his own. Thus the present ruling house is the Goyon-de-Matignon-Grimaldi. The National Convention annexed the principality to France in 1793. By the Treaty of Vienna it came under the protection of Sardinia. In 1861 the communes of Mentone and Roccabruna (Roquebrune) were ceded by Sardinia to France, for which the Prince of Monaco received in the following year an indemnity of 4,000,000 francs. The war which broke out in Europe in 1914 (see WAR IN EUROPE) was very disastrous for Monaco. The gaming tables were perforce deserted and thus its most profitable source of income cut off.

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question des jeux (ib., 1898); H. France, *Au pays de Cocagne: la principauté de Monaco* (ib., 1901); L. Taxil, *Monaco* (ib., 1905); E. C. Mayne, *Romance of Monaco and its Rulers* (New York, 1910); Adolphe Smith, *Monaco and Monte Carlo* (London, 1912).

MONACO. The capital of the Principality of Monaco, situated on a promontory in the Mediterranean, about midway between Nice and Mentone (Map: France, S., M 5). Its chief buildings are the palace of the Prince, with a beautiful garden, and the new cathedral, built in the Romano-Byzantine style. Near the town is the famous gambling resort of Monte Carlo (q.v.). The adjoining commune of Condamine has a railway station and some industries. Monaco is a sea-bathing resort and its climate is considered very healthful. Pop., 1913: Monaco, 2247; Condamine, 11,082.

MONACO, Albert Honoré Charles, Prince of (1848–1922). Ruler of the Principality of Monaco (q.v.) and an oceanographer. Born in Paris, he received a French education and served in the Spanish navy as ensign, but entered the French navy as lieutenant in 1870 during the Franco-German War. In 1889 he succeeded his father Charles III (1818–89). He was married twice, but divorced each time. His first wife was Lady Mary Douglas-Hamilton (later Countess Festetics), by whom he had a son, the heir apparent, Louis Honoré Charles Antoine, born at Baden-Baden in 1870; his second wife was Alice Heine, the widow of the Duke of Richelieu and a member of the family of Hamburg bankers. In 1911 he granted a constitution to the principality. The Prince of Monaco undertook a number of scientific voyages to investigate deep-sea life and sea currents; in 1899, with Thoulet and Saverweiss, he was appointed a member of the committee charged by the Geographical Congress at Berlin with the preparation of a map of the oceans (24 parts, finished 1904). On one of his trips he visited the United States (1913). He is the author of *La carrière d'un navigateur* (2d ed., 1905) and many essays on oceanographic researches.

MONACO, Lorenzo. See Lorenzo Monaco.

MO'NAD (from Lat. *monas*, from Gk. *μονάς*, unit, from *μόνος*, *monos*, single; connected with Ger. *man*, only, Lith. *mináu*, throughout). 1. In early modern philosophy, a term used to designate the ultimate elements of reality (Bruno). By Leibnitz, from whose system the name has derived importance, it is used to designate the spiritual atoms which compose the universe. (See Leibnitz.) 2. In biology, a generic term for a simplest organism defined as being without a nucleus. In the old system of Ehrenberg, *Monas* was a large genus, but it has become more and more restricted, as better methods and apparatus have resulted in the discovery of a nucleus where none was believed to occur. The forms once included in the genus are now distributed among the flagellate Infusoria on the one hand (Haeckel's Monera; see Moner) and the bacteria on the other. As it is quite probable that there is no organism without nuclear matter, the name is practically obsolete.

MONAD'NOCK. A hill or mountain which projects above the general level of an old eroded mountain surface. In the process of denudation it not infrequently happens that certain prominences by reason of their being formed of very hard resistant rocks withstand the wear much more effectually than the surrounding mountains so that they still present considerable elevations after the latter have been reduced to a nearly plane surface. Such remnant mountains are called monadnocks, after the mountain of that name in New Hampshire.

MONAD'NOCK, Grand. An isolated mountain in Cheshire County, in the southwestern corner of New Hampshire (Map: New Hampshire, E 8). It is regarded as an outlying member of the White Mountain group, is 3186 feet high, and commands a fine view from its summit.

MONAGAS, mō-nä'gȧs, José Gregorio (1795–c.1870). A President of Venezuela, brother of José Tadeo Monagas (q.v.), born in Maturín. His early life was spent as a herdsman on the plains and he served with some distinction in the War of Independence. He aided his brother in the insurrections of 1831 and 1835 and in 1850 was elected to the presidency through the support of José Tadeo. His administration was tranquil and his one service to the country was the signing of the law abolishing slavery, which was passed at the close of his term (March 24, 1854).

MONAGAS, José Tadeo (1788–1868). A Venezuelan soldier and president, born at Maturín. Having received a common education, he became manager of a large estate, and when the War of Independence broke out he joined the Patriot army and served with distinction. He led revolts against the conservative oligarchy in 1831 and 1835, but later aided this party in crushing out a liberal revolt (1846). In this latter year, with the support of ex-President Paez and the conservatives, he was elected to the presidency. Preferring to govern with the liberal element, he alienated the conservatives, who endeavored to bring charges against him in Congress. He saved himself from making a defense by instigating a riot in Congress in which a number of the conservatives were killed (Jan. 24, 1848) and opposition to his dictatorial rule was crushed. Paez started a revolt, but Monagas forced him to surrender (1849) and sent him into exile. In 1850 he secured the election of his brother José Gregorio to the presidency, but four years later he himself was again elected to this office. He carried out a revision of the constitution (1857), partly with a view to maintaining himself in power, and was reëlected again for a term of six years (April 18, 1857). The next year a revolution headed by Castro took place, and Monagas was forced to resign and to go into exile. Ten years later he returned to Venezuela, led a successful revolt against President Falcón, and was again elected President, but died before taking office.

MONAGHAN, mŏn'*a*-*gan*. An inland county in the southern part of Ulster, Ireland (Map: Ireland, E 3). Area, 496 square miles. The surface is in general undulating, with a gradual slope from southeast to northwest. The highest point is 1250 feet above the sea. It is watered by the Finn and the Blackwater. Less than half the area of the county is arable, producing cereal crops (with the exception of wheat) and flax. There are manufactures of linen; freestone and slate are quarried; cattle, sheep, and pigs are raised. The principal towns are Monaghan (q.v.), the county seat, Carrickmacross, Clones, and Castle Blayney. Pop., 1841, 200,500; 1901, 74,611; 1911, 71,455.

MONAGHAN. The capital of County Mon-

aghan, Ireland, 52 miles southwest of Belfast (Map: Ireland, E 3). Among its public buildings are the market house, courthouse, a national model school, Roman Catholic college, convent of St. Louis, and the modern cathedral of St. MacCarthain. The town is the centre of a trade in flax and grain. Two markets for agricultural produce are held weekly and there is also a monthly fair. Near by is Rossmore Park, the residence of Lord Rossmore. Pop., 1901, 2932; 1911, 4272.

MONALDESCHI, mō'nâl-dēs'kē, GIOVANNI, MARCHESE. An Italian noble of the seventeenth century, a favorite of Christina of Sweden. He was a member of a noble family of Ascoli and a leader of the French party at Rome; and after the disgrace of Pimentelli and the Spanish party at the Swedish court came into the favor of the Queen. In 1657, during her visit at the French court, she accused him of high treason and had him assassinated at Fontainebleau. The real reason for his murder is unknown. Consult Martens, *Causes célèbres du droit des gens* (2d ed., Leipzig, 1858).

MONA LISA, mō'nà lē'zà. See VINCI, LEONARDO DA.

MO'NA (Sp., Portug., It., female monkey) **MONKEY.** A west African guenon (*Cercopithecus*, or *Lasiopyga, mona*), familiar in menageries and as a pet. It is of small size, black on the back, with the face purple, except the pink lips and chin. The undersurface is white, abruptly demarked from the black mantle; the bushy whiskers are yellow; a gray band extends across the forehead; and there is an oval white spot on each side of the root of the tail. It is a docile and interesting animal. Cf. GUENON; DIANA MONKEY.

MON'ARCH. See MILKWEED BUTTERFLY.

MONARCHIANS, mŏ-när'kĭ-anz (from Gk. *μοναρχία, monarchia*, sole power, from *μόναρχος, monarchos*, monarch, from *μόνος, monos*, single + *ἄρχειν, archein*, to rule). A term of Christian theology, applied to certain persons in the early Church who objected to the orthodox Christology on the ground that it suggested two gods (or three, if the Holy Spirit was included), and who maintained, in opposition, what was called the divine 'Monarchy' (Gk. *μοναρχία*), or essential oneness of the Deity. The questions at issue were the relationship of Christ to the Father and Christ's preëxistence. If Christ was God incarnate, as the Church taught, then it must follow, said some, that God has entered the world and has lived, suffered, and died among men. Christ is indistinguishable from God the Father and is merely a form or mode of manifestation of the supreme Deity, who might reveal Himself as Father, Son, or Spirit. This doctrine was called Modalism, or, more exactly, Modalistic Mŏnarchianism. It was also known as Patripassianism, from the fact that it represented the Father as suffering. Among its adherents were Praxeas, an Asiatic Christian, who visited Rome late in the second century and was opposed by Tertullian and by Noëtus of Smyrna, whose views were combated by Hippolytus. The most celebrated Modalist, however, was Sabellius (q.v.), who flourished early in the third century and who taught that the Trinity consisted of three successive manifestations of God in history. Eastern Modalism was commonly called Sabellianism after him, and this name ultimately came into use in the West also.

But there were some Christians who attempted, in just the opposite fashion, to answer the question how Christ was related to God. Their method was not identification but distinction. Christ they held to be a created being, a man like other men, but they believed he became the Son of God by adoption, through an impartation of divine powers, usually regarded as received at his baptism. These persons are known as Dynamic Monarchians (from Gk. *δυνάμεις*, powers), to distinguish them from the other Monarchians described above. One of the leaders of this school was Theodotus the Tanner, who came to Rome from Byzantium late in the second century and was there excommunicated by Pope Victor I. Another leader also bore the name Theodotus. He was a money changer, a disciple of Theodotus the Tanner. Artemon, in the third century, continued the same teaching. All these three appear to have been laymen. The Theodotians and Artemonites were called after them and figure prominently among the third-century heretics. Dynamic Monarchianism found an able representative in Paul, Bishop of Samosata and Prime Minister of Zenobia, Queen of Palmyra, who was excommunicated by an Asiatic synod about 268. (See PAUL OF SAMOSATA.) The Dynamic Monarchians were probably much less numerous than the Modalists.

Over against all these Monarchians of either type the main body of the Church maintained the divinity of Christ along with his personal distinction from the Father. The orthodox doctrine was that Christ is a preëxistent divine hypostasis (q.v.), who became man through the incarnation and is therefore both God and man, two natures in one person. Irenæus, Tertullian, Hippolytus, Novatian, and especially Origen, all contributed towards this doctrinal development, and in the fourth century the Monarchian controversy gave way to the Arian. (See ARIUS.) Consult: Adolf Harnack, *History of Dogma*, vol. iii (Boston, 1897); G. P. Fisher, *History of Christian Doctrine* (New York, 1896); Smith and Wace, *Dictionary of Christian Biography* (4 vols., London, 1877–87), articles "Theodotus," "Artemon," "Praxeas," "Noëtus," "Sabellius," "Paul of Samosata," etc. See CHRISTOLOGY.

MON'ARCHY (Lat. *monarchia*, from Gk. *μοναρχία*, sole power). In the strict sense of the term, that form of state in which the sovereign authority is vested in a single person. It is only when the king or chief magistrate of the community possesses the entire ruling power that he is, in the proper acceptation of the term, a monarch; but in a mere popular sense the term "monarchy" is applied to any state in which the chief executive authority is vested in a single hereditary ruler. The degenerate form of monarchy is tyranny, or government for the exclusive benefit of the ruler. When the head of the state, still possessing the status and dignity of royalty, shares the supreme power with a class of nobles, with a popular representative body, or with both, the government, though no longer in strictness monarchical, is called in popular language a mixed or limited monarchy, the term "absolute monarchy" being applied to a government properly monarchical. If the monarch in the exercise of his powers is restrained by the precepts of a constitution, the state is commonly styled a constitutional monarchy. Monarchy, although usually hereditary, has sometimes been elective, a condition generally attended with feuds and distractions, as

was the case in Poland (q.v.). Constitutional monarchy may be in its origin elective, or combine both systems, as when one family is disinherited and the sceptre declared hereditary in the hands of another under certain conditions, as occurred in England in 1688. See GOVERNMENT; KING; REPUBLIC.

MO'NAS. See MONAD.

MON'ASTERY (Lat. *monasterium*, from Gk. *μοναστήριον*, monastery, solitary dwelling, from *μοναστής*, *monastēs*, solitary man, monk, from *μονάζειν*, *monazein*, to dwell alone, from *μόνος*, *monos*, single). The generic name of the residence of any body of men (or even, though more rarely, of women) bound by monastic vows. In its strict application it is confined to the houses of monks properly so called, but is frequently used of the establishments of the mendicant and more modern orders. The older monasteries were divided into two great classes, abbeys and priories. The former name was given only to the important or mother houses, governed by an abbot, who was commonly assisted by a prior, subprior, and other functionaries. An abbey always included a church, and the English word minster, still applied to churches no longer part of a monastic establishment, had its origin in the Latin *monasterium*. A priory supposed a less extensive and less numerous community. It was governed by a prior and was originally subject to the jurisdiction of an abbey. This was the Benedictine rule; but in other orders, such as the Carthusian, the title of prior was uniformly used instead of abbot. In the military orders the names commandery and preceptory were used instead of abbey and priory. The name cloister is sometimes applied to the whole monastery, considered as an inclosed place; the term is also used, in a narrower sense, to designate the arcaded ambulatory which runs around the inner court of the buildings. Below the officials already mentioned the ordinary monks were generally divided into two great classes—choir brothers (frequently, in later times almost universally, in holy orders), so called because they were required and by their education qualified to take part in the singing of the choir offices, and lay brothers, who, instead of this duty, had the household cares of the community. For the principles of monastic life and the history of its development, see MONASTICISM; and, for the important part played by monasteries in the growth of architecture and its kindred arts, see MONASTIC ART.

MONASTERY, THE. A novel by Sir Walter Scott (1820). It is a story of the sixteenth century, of the days of Murray, the Regent, and had for its sequel *The Abbot* (q.v.).

MONAS'TIC ARCHITECTURE. The architecture of monastic and conventual institutions or communities. The Buddhists of India practiced monasticism from an early date (see INDIAN ART; ARCHITECTURE), and their *chaityas* or rock-cut chapels and *viharas* or community-buildings, many of which are also rock-cut, are mostly contemporary with the earliest Coptic monasteries, dating from between the fifth and eighth centuries A.D. Eastern orthodox monasticism has persistently retained, in the building and decoration of its chapels, refectories, etc., the Byzantine tradition down to the present day as at Mount Athos, Hagia Iriada, Rilo in the Balkans, Ani and Etchmiadzin in Armenia, and other centres.

The Western church, on the other hand, developed an architecture, as well as monastic systems of its own, especially in France, where the various branches of the Benedictine Order were particularly influential in architectural development. Amid the social and political chaos of the so-called Dark Ages it was the monasteries which, in France, England, and Germany at least, represented to the multitude most forcibly the universal power, authority, and discipline of the Church, unshaken by all the tumults about them. They became the refuges of all who wished to flee from war and feudal service, the centres of Christian learning, culture, and art; and by the middle of the eleventh century had acquired great wealth in land, men, and money; populous communities of clerical and lay brethren, for whom and by whom were built churches (abbeys), cloisters, refectories, hospitals, bakeries, hostels, and cells or houses for residence. In these the Western Romanesque style was developed to its highest expression, in all three countries, in the twelfth century. (See MONASTIC ART and ROMANESQUE ARCHITECTURE.) With the growth of settled government and the development of the royal and episcopal authorities in France, the building of great abbeys ceased, and a new movement began in France in the building of cathedrals, in which the new Gothic style gradually superseded the round-arched Romanesque. For the bibliography of this subject, see under MONASTIC ART.

MONASTIC ART. The art peculiar to the monastic orders. In the development of Christian art monasticism was at times the determining cause. The *Basilian* and other groups of monks in the East during the entire Middle Ages; the *Benedictines* in the West from the eighth to the eleventh century; the *Cistercians* during the twelfth; the *Franciscans* and *Dominicans*, especially in Italy, during the thirteenth and fourteenth centuries, produced a large proportion of the works of art of those periods. The influence of these orders was seldom exercised on the material side of the various arts, but more generally and radically on the choice and treatment of subject.

Basilian Art. The monks of the Order of St. Basil were the best organized and most numerous of the monastic aggregations in the East, and their influence upon Christian art was the most important produced by Eastern monasticism. Oriental monasteries cannot compare with the largest in the West; but, on the other hand, study of them is more interesting, because so many more remain comparatively intact and are of so early a date. The groups in the Egyptian Desert, e.g., date mainly from the fourth and fifth centuries, and some of those in Old Cairo are not much later. The usual type is an immense inclosure surrounded by a high wall like that around an Egyptian temple. Within the court the monks' cells are built against the inner edge of this wall, leaving the central space free for two or three churches, a large refectory, and a strong watch tower which contains the treasury and library. Next in age come the monasteries of the cities of central Syria (fifth and sixth centuries), with a common cloister. Scattered over Syria and Palestine, beginning with Justinian's famous monastery of St. Laba, on Mount Sinai, are monastic establishments of the Syrian monks which rivaled those of Egypt. They have been very little studied. But the

period succeeding the Iconoclastic movement is represented by some monasteries at Constantinople (e.g., St. John Stoudios), Saloniki, Chios, Daphne, and St. Luke in Greece, and especially by those of the Holy Mountain, Mount Athos, the centre of Hellenic monasticism from the eleventh century to the present day. The general plan of the Mount Athos monasteries was similar to that of the Egyptians, with the difference that a better organization had brought. The separate monasteries were dotted over the mountain, each in its inclosing wall. Their churches, treasuries, frescoes, and manuscripts have been carefully studied; they form one of the most interesting groups remaining from the Middle Ages. Some of the buildings are as early as the tenth and eleventh centuries, with mosaic pavements, decorative sculptures and mosaics, but the frescoes are all much later. The most interesting group in Thessaly are the famous monasteries of Meteora, which the visitor can reach only by being hauled in a basket to the top of a high precipitous rock. Here the buildings are not so old as those at Mount Athos. In the strong Byzantine revival under Basil the Macedonian and his successors (ninth and tenth centuries) the monks played an important part as colonists. Traces of their monasteries and hundreds of their anchoretic caves with Byzantine frescoes are found, e.g., in Calabria, Apulia, and other parts of southern Italy. Before then, in the eighth century, the Iconoclastic persecutions had driven to Italy many Basilian monks who as painters could no longer practice their art safely in the East. They gave the strongly Byzantine tinge to the art, especially the painting and decorative sculpture of the Roman school, which thence spread over the rest of Europe. There were over 20 Greek monasteries in Rome, large and small, before the eleventh century. That of Grottaferrata, near Rome, became the greatest representative of the Basilians in the West outside of southern Italy, and still has interesting early mosaics and sculptures.

While the monastic and lay artists of Europe developed their styles of architecture with but little reference to the East, the arts of ivory carving, enameling, goldsmith work, mosaic, tapestry, and embroidery were perpetuated in the Eastern monasteries and by them transmitted to the Western monks of the Carlovingian age. To the Eastern monks also was due a dominant part in perfecting the system of Christian iconography which was, in part at least, adopted in the West, including the artistic types of Christ, the Virgin, John the Baptist, the Apostles, angels, and saints, as well as the arrangement of most of the subjects of the Old and New Testaments. This influence was supreme in Italian painting, e.g., up to the time of Giotto. With the name of the monk Panselinos will always be connected that written textbook of painters used until the present day by Neo-Byzantine artists.

Benedictine Art. The earliest establishments of the founder of the Order of St. Benedict at Subiaco and Monte Cassino have left no traces to show that they had any special artistic significance. Most of the Western monasteries of the seventh century were of wood, and the life was still largely anchoretic. It was in the eighth century, as the Carlovingian era approaches, that Benedictine life became more highly organized, types of monastic buildings were created for all time, and monasteries of great wealth and power arose, taking a leading part in art. Centula, Lorsch, Fontanella, and Fulda were followed by Nanantula, Monte Cassino, Cava, Saint-Gall, Tours, Reichenau, and many other great artistic centres. The cloister, a new architectural form adapted from the atrium of the early Christian basilica, became the centre around which the monastic buildings were grouped. For the general plan and organization of the monastery and its early artistic activity, consult the article BENEDICTINES.

In the tenth century the great Benedictine reform took place at Cluny, which henceforth was the leading monastery of the order, using the establishments of Hirsau and Farfa to further her artistic and other reforms in Germany and Italy. The plans used in rebuilding and reorganizing these two monasteries were borrowed from Cluny. The revival which ensued led to an immense increase in the number of establishments. In Italy alone art became partly enfranchised, with a notable increase of lay artists, due to the great prosperity of the free communal cities.

The style of architecture practiced by the Benedictines during these centuries did not show much originality. It retained in the churches the old basilical type, with columns and wooden roof, though piers were occasionally used. The lack of close, organized union between the different monasteries of the order prevented the creation of a special Benedictine style. The work had local characteristics. In newly converted and civilized regions the monks were always the pioneers of art, and in this way, even without special style, became a paramount influence. But in fresco painting and in the minor and industrial arts the case was different. (See BENEDICTINES.) The monks partly introduced Byzantine methods and ideas, as in the school founded in the eleventh century by Desiderius at Monte Cassino, for nearly all branches of art, partly evolved a special style and iconography, as in Germany and France. The lay guilds of the late Romanesque and Gothic periods were merely offshoots from these monastic schools. The intellectual attainments of the monks peculiarly qualified them in developing systematically the themes of religious art, which they handed on to their lay successors, who had but to accept and vary them.

Cistercian Art. The Cistercian monasteries were not, like the Benedictine, centres of the industrial and minor arts; no provision was made for the practice of ivory carving, goldsmith work, enameling, illuminating manuscripts or fresco painting, mosaic work, and monumental sculpture. On the other hand, it was necessary to train a school of architects that should understand the special needs of the order and build according to its rules. This school originated in Burgundy, and as the order spread over the whole of Europe and part of the Orient during the twelfth century and became the most powerful of all monastic institutions, as well as the most perfectly organized, its architects carried the Burgundian Cistercian style over a large part of the then civilized world. Pontigny in France, Maulbronn in Germany, Fossanova in Italy, Veruela in Spain are typical establishments in good preservation of the twelfth and thirteenth centuries. The high walls, inclosing the entire establishment and insuring protection against raids, as well as

marking the cloistral limits, were entered through a monumental gateway, and contained large warehouses, barns, and stables, and often a mill, a hospital, and chapel, as well as the main quadrangle of buildings, flanked by a cemetery, garden, and orchard. Of this quadrangle the church usually occupied the left flank, facing the gateway, the dormitories being on the front and rear of the quadrangle around the cloister, on the second floor, the ground floor being occupied by a chapel and chapter house on the side near the church, a refectory and kitchen on the side opposite the church, and reception rooms, passageways, and staircases on the front.

The architectural style of these buildings was plain on principle. The church had a plain gable front without towers, and its material was of stone or brick, left undecorated by figured sculptures or frescoes. The practical element, being so strongly developed, led to a divorce of the decorative from the structural elements in architecture. Stress was laid upon forms of vaulting, and the order became associated with the substitution of tunnel, groin, and ribbed vaulting for wooden roofs throughout a large part of Europe. But the influence of the new Gothic constructive forms commenced in Burgundy towards 1160, and the Cistercian architects quickly adopted them as in harmony with their own ideas and propagated them throughout Europe. Nevertheless the order never developed the Gothic style in its entirety or to its ultimate forms, but rested satisfied with its elementary stage as more in harmony with the simple ideas of the order.

The monastic buildings of Fossanova in Italy are a good example of structures built by French Cistercian constructors imported from Burgundy; those of the neighboring Casamari exemplify the handiwork of the native artists taught by these Frenchmen. So it was everywhere, especially in Germany and England, where local peculiarities soon strongly modified the imported styles, and before the close of the thirteenth century the original strictness of the order was relaxed and, especially in France, the entire rich system of Gothic decoration adopted, with its tracery, floral sculpture, and stained glass. With the fourteenth century the decadence of the order, replaced in popularity by the Franciscans and Dominicans, removed it as a serious factor from the field of art.

Franciscan and Dominican Art. The monasteries of these orders were in or near the cities, so that the members could take part in the daily life of the people. There were ordinarily no high encircling cloistral walls, no arrangements for teaching the arts (except occasionally that of illuminating manuscripts or doing goldsmith work), no warehouses. The art of the mendicant orders was especially important in Italy. At the beginning the Cistercian style furnished models for church and cloistral architecture, but soon these borrowed traits dropped into insignificance when compared with the original features that were developed. The emphasis laid upon preaching in their churches to the masses and thus influencing public sentiment led to the creation of two new types of monastic church—that with lofty aisles and with widely spaced supports between nave and aisles and the hall-church type with no aisles. In both cases the object was to place large congregations within sight and hearing of the pulpit. San Francesco at Assisi, the mother monastery, was the model for the hall-church type; San Francesco and San Domenico at Bologna for the three-aisled type. Of the greatest churches of the thirteenth century in Italy nearly all were built by monks of these two orders—Santa Maria Novella and Santa Croce at Florence, Santa Maria dei Frari and Santi Giovanni e Paolo at Venice, Santa Maria sopra Minerva in Rome, Sant' Anastasia at Verona, San Francesco at Ascoli.

While the orders were less prominent in the architecture of the rest of Europe, they certainly popularized in Germany the use of the hall church, which became a very common type; but the predominance of cathedral architecture and the continued prosperity of the Cistercians limited their sphere.

Of even greater importance was the effect of the orders on sculpture and painting. The thought and feeling, the system and symbolism that lay behind the great schools of fresco painting of Florence, Siena, and other Italian centres, as well as the French schools of cathedral sculpture at Chartres, Rheims, Amiens, Bourges, Paris, are due to the influence of St. Francis, St. Dominic, and their successors, such as St. Bonaventura and Thomas Aquinas. The encyclopædic thinkers who furnished the ideas and directed the hand of sculptors and painters were the teachers of these orders, who also directed the thought of the universities of Europe. The frescoes in the church of San Francesco at Assisi, in the Spanish Chapel, Santa Maria Novella, Florence, the Palazzo Pubblico at Siena, and of Orvieto Cathedral, are their work, in symbolism, in teaching, in all their higher value. The bold attempt to represent the origin, character, and history of the universe in art, made by the decorators of the French Gothic cathedrals, had precisely the same source. The corresponding printed pages are to be found in Vincent of Beauvais's *Speculum Universale* and other similar literary encyclopædias. It is by reading the life and legends of St. Francis, by studying the important rôle of the preachers in the popular movements, by reading the sermons of the great preachers, that one can realize how clearly the mystic and allegorical art of the thirteenth and fourteenth centuries is a creation of these orders and merely a part of a great wave of social reform that was due largely to them. Giotto, the Gaddi, Orcagna, Andrea Pisano, and other artists, while not members of the orders, expressed their ideals.

Other Orders. Of all the Western orders only one returned in the Middle Ages to the anchoretic idea and expressed it in beautiful architectural movements. This was the Carthusian Order (Chartreux) of St. Bruno, founded in the eleventh century. The individual cell life of each member determined the form and character of the monastic buildings, which covered a great extent of ground, usually around two immense cloisters or open courts.

The secularizing of art, which began in the thirteenth century, was carried further forward by each century of the Renaissance. What the art guilds commenced humanism completed. The monastic orders exercised no influence in art after the fourteenth century, even though some individual members were prominent artists, such as Fra Angelico, Filippo Lippi, Bartolommeo, the painters; Fra Giocondo, the architect; etc.

Bibliography. The entire theme of monastic

art is so interwoven with the history of Christian art as a whole, as to have eluded treatment. Lenoir, *Architecture monastique* (Paris, 1852–56), has given a very good summary of this part of the subject; for another excellent survey of French monastic architecture, consult Viollet-le-Duc, *Dictionnaire raisonné de l'architecture française*, s. v., Architecture, Architecture monastique. Other general works are: Wiese, *Ueber das Verhältnis der Kunst zur Religion* (Berlin, 1878); Springer, *Klosterleben und Klosterkunst* (Bonn, 1886); Schlosser, *Die abendländische Klosteranlage des früheren Mittelalters* (Vienna, 1889); Kraus, *Geschichte der christlichen Kunst* (Freiburg, 1896). For the Basilians, see Brockhaus, *Die Kunst in den Athos-Klöstern* (Leipzig, 1890), Balhr, *Le monastère byzantin de Tebrassa* (Paris, 1897); Millet, *Le monastère de Daphne* (ib., 1899); Schultz and Barnsley, *The Monastery of St. Luke of Stiris in Phocis* (London, 1901); for the Benedictines, Krätzinger, *Die Benediktinerorden und die Kultur* (Heidelberg, 1876); for the Cistercians, Sharpe, *The Architecture of the Cistercians* (London, 1874); for the Dominicans and Franciscans, Enlart, *Origines françaises de l'architecture gothique en Italie* (Paris, 1894); Louis Gillet, *Histoire artistique des ordres mendiants* (Paris, 1912); for subjects often represented in monastic art, see Mrs. Jameson, *Legends of the Monastic Orders as Represented in the Fine Arts* (London, 1872); also the authorities referred to under CHRISTIAN ART; BENEDICTINES; CISTERCIANS.

MONASTICISM, mŏ-năs'tĭ-sĭz'm. The general term used to describe the system under which those men and women live who have abandoned the world for religious reasons and live, whether separately or in community, in the pursuit of spiritual perfection. The vows under which they live (for details, see VOW) are based upon what are known as the evangelical counsels (q.v.) or maxims to guide those who are desirous of attaining perfection in this life. From their being bound by such vows, these people are known as religious (Lat. *religare*, to bind). The term "monk" is correctly applied only to the members of the older or more strictly cloistered societies, and not to the mendicant orders, such as the Dominicans and Franciscans, whose members are termed friars. The word "monk" is, however, sometimes loosely applied to any who withdraw from the world to give themselves wholly to the service of God and their neighbor under the vows of poverty, chastity, and obedience.

Forms of monasticism existed among the so-called pagan nations long before Christ. Buddha found the institution a practically essential feature of Brahmanism when he began his work about the sixth century before Christ. Among the Hindus, the Laws of Manu provide that, after the rearing of a family, members of the three upper castes may retire to a hermit life and seek truth in contemplation. Buddha created a monastic order, for whom he drew up a set of rules that contain many analogies with the rules of Christian religious orders. Among the Greeks the members of the Orphic brotherhood and the followers of Pythagoras showed marked tendencies to monasticism. In Egypt the worship of Serapis was associated with the foundation of monasteries. The largest institution of the kind was that at Memphis, which flourished just after the Alexandrian period. German antiquaries have pointed out many similarities between the old Egyptian monasticism and the later Christian monastic foundations in the same country. Among the Jews the Essenes (q.v.) seem to have had some of the characteristics of a religious order.

The first reference to the monastic life in Christian writers is considered by some to be a letter of St. Ignatius of Antioch, who in his letter to Polycarp mentions the vow of virginity. The first Christian hermits seem to have established themselves on the shores of the Red Sea, where in ante-Christian times the Therapeutæ, an order of pagan hermits, had been established. Not long afterward the desert regions of Upper Egypt became a favorite retreat for those who fled from the persecutions of the Christians so frequent during the third century, or who found the vices of the decadent Roman Empire intolerable. Among the earliest of these fathers of the desert was Paul of Thebes (q.v.), who lived for over 100 years (228–?340) on the fruit of the date tree and water, clothing himself in palm leaves. After Paul came Antony (q.v.), who was the first to gather together the scattered hermits in lauras. These first cenobites had their collections of cells in the deserts of the Thebaid. The life of St. Antony was written by Athanasius, at whose request he abandoned his solitude for a time during the troubles caused by the Arians. While the heresy was rampant, Antony established himself at Alexandria, and the fame of his sanctity, as well as his gentleness and learning, drew many disciples to him. Not a few of these new followers accompanied Antony when he again retired to the desert. His greatest disciple was Macarius of Alexandria, who died in 394 and whose reputation for wisdom and saintliness attracted many monks to the various hermitages over which he ruled. Apparently about the beginning of the fourth century monks began to live together under a common roof, and buildings began to be erected as monasteries instead of the separate cells in which the hermits had lived. Pachomius (q.v.) founded an immense monastery about 340 on the island of Tabennæ in the Nile. He drew up for his subjects a monastic rule, the first definite set of regulations of the kind on record. Many thousands of disciples flocked to him, and he founded several other monasteries for men, and one for women under the direction of his sister. All of these institutions recognized the authority of a single superior—an abbot or archimandrite. They constitute the original type of the religious order. St. Basil the Great (q.v.) made a visit to the Egyptian monasteries shortly after his student days at Athens, about the time that Pachomius was beginning his work. Basil, on his return to Asia, founded monasteries in Pontus and Cappadocia, thus acquiring the name of Father of Monasticism in the East. The Greek father drew up a set of rules, still extant, which has influenced subsequent founders of religious orders more than any other.

St. Jerome translated the rule of Pachomius into Latin for the use of his own monks at Bethlehem and of certain of the Latins in Italy. Dom Gasquet says that in the time of St. Jerome and St. Augustine the monastic life was well recognized as an integral part of the Church's system. There was no established code of rules, however, to which all the monks were bound to conform themselves; an individual

might pass from this or that house to any other in which the monastic life was led. Monasteries continued to spring up in many parts of the West during the fourth, fifth, and sixth centuries. One of the most famous of these was situated on the Iles de Lérins in the Mediterranean Sea, off the coast of France, near the present town of Cannes. Another was that founded by St. Martin of Tours at Poitiers, under the direction of St. Hilary, Bishop of that city. Many monasteries flourished in Ireland during these centuries and furnished missionary monks who spread not only Christianity, but also civilization and an awakening love for literature and the arts, among the barbarians who had overrun the continent of Europe. Columbanus, an Irish monk of the end of the sixth century, drew up a monastic rule that, because of its strictness, has been the model of many subsequent austere orders. Perpetual silence, complete abstinence from flesh meat, daily fasting, labor, reading, prayer, poverty, humility, and chastity are the essence of his prescriptions.

The monastic rule which had most influence in the West, however, was that of St. Benedict, who about 529, after a youth passed as a solitary, gathered some monks who had been attracted to his solitude at Subiaco and founded the monastery of Monte Cassino. This became the mother house of Western monasticism. Benedict founded seven other monasteries (among them one for women under the direction of his sister, St. Scholastica, at Piombiarole, about 5 miles from Monte Cassino) and deservedly bears the name of Patriarch of the Monks of the West. Benedict's rule is characterized by a wide and wise discretion. To secure the end more certainly, those who desired to walk in the path of the Gospel counsels under his guidance promised a lifelong obedience. "This was the first introduction of a *profession* for life according to the rule; and it was known to the monk who wished to fight under the law that as the rule says 'From that day it was not lawful for him to withdraw his neck from the yoke of the rule.' The result of this introduction was twofold: on the one hand it established firmly the perpetuity of the cloistral family life, that stability in the community which has since become the characteristic mark of monasticism; and on the other hand for the only will of the abbot or superior, it substituted a code of laws by which his government was to be guided." (Gasquet.) Nevertheless the rule itself shows that, though St. Benedict required obedience to his code of regulations, he never intended to forbid other customs and practices. In fact, he expressly refers his followers to the rule of St. Basil and others for further guidance.

The immediately succeeding centuries saw a wonderful development of monasticism in the West. The monasteries became the home of learning. Monks were the teachers of the world and went forth as missionary preachers into England, Germany, and the nations of northern and central Europe. Agriculture as well as civilization became their care, and the first serious attempt to do away with serfdom was under their rule. Education for women developed first in the convents and then spread to their sisters in the world, until women were better educated than at any preceding period in history. In the monasteries and convents expert nursing of the sick and wounded and the first germs of modern clinical medicine developed. Many members of royal families became monks and nuns, and the first glimmer of understanding between different orders of society appeared.

According to the rule of St. Benedict, each monastery was separate and wholly distinct, with an independent life of its own. The first serious attempt at union was made at a great assembly held at Aix-la-Chapelle in 817, under the guidance of St. Benedict of Aniane. Here rules for the better regulation of monastic life were passed. Benedict had great influence with the Emperor Louis the Pious, the son of Charlemagne. He planned to secure the most absolute uniformity among the monks of all monasteries and was seconded in his effort by the sovereign. Benedict was chosen as general. This assembly caused a reawakening of the monastic spirit throughout Europe and affected also England, where the *Concordia Regularis*, which prescribed one set of monastic customs for the whole of England, was adopted. In the next century occurs the greatest name in monastic history, that of Cluny. The ideal of Cluny was the existence of one great central monastery, with dependencies spread over many lands and forming a vast feudal hierarchy. The subordinate monasteries were dependents in the strictest sense. Their superiors were not called abbots, but priors. The superior of every house, however great, was the nominee of the abbot of Cluny; the profession of every member was made in the name and with the sanction of the abbot of Cluny. Cluny remains, in spite of the defects of its feudal character, one of the chief factors in the history of the eleventh century. The authority of Peter the Venerable, the contemporary of St. Bernard, was recognized by 2000 dependent monasteries. The Cistercian system of monasticism is the next feature of historical development. It was founded by St. Stephen Harding, an Englishman, who early left his own country to live in France. He adopted the rule of St. Benedict; the heads of other houses were abbots, but attached to the mother house by the obligation of yearly assembling at Cîteaux, while the abbot of Cîteaux had the right to visit all other monasteries and, while forbidden to interfere with the management of their temporalities without the consent of the community, could insist on reforms in discipline if he deemed them necessary. The greatest of the Cistercians was St. Bernard, who founded, with 32 young nobles, the monastery of Clairvaux.

During the Crusades came the organization of religious bodies for definite pious purposes whose members were bound by the usual obligations of monasticism, yet did not withdraw entirely from the world. The Knights of St. John (see SAINT JOHN OF JERUSALEM, KNIGHTS OF), the Knights Templars (q.v.), and the Teutonic Knights (q.v.) are the best known of these. Incited by their example, or as a result of the same spirit, many nonmilitary religious orders were founded during and just after the Crusades, with the purpose of definite work to be accomplished outside of the monasteries.

The fourth Lateran Council decreed that no further religious orders should be founded, yet the first quarter of the thirteenth century saw the rise of two great mendicant orders, those of St. Francis (see FRANCISCANS) and of St. Dominic (see DOMINICANS). The members of these orders, in spite of their vow of absolute

poverty, soon became prominent in the Church and in the universities and as poets, preachers, philosophers, writers, scientists, and teachers. The next great advance in monasticism was the foundation of the Jesuits (q.v.), a teaching, preaching missionary order with a special vow to go wherever they should be sent by the Pope. Their institute has proved the model on which most modern religious congregations have been based.

Monasticism has been, at least in the West, in constant development, always growing more closely in touch with the shifting environment in which it was placed in the course of time. The skeptical spirit of the eighteenth century was unfavorable to monastic evolution, but the nineteenth saw a reawakening. Persecution and confiscation for political and pecuniary reasons have reduced the numbers of religious communities, but under a system of true religious liberty, as in the United States, wide extension of the religious orders has come about. In the religious communities of the United States in 1915 there were 4415 brothers, 3788 priests, and 55,575 sisters. There were also many novices and postulants not included in these figures.

For further details of the monastic life, the general arrangement of monasteries, and the relation of the older orders to the development of European civilization, see the articles on the various orders, especially BENEDICTINES.

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MONASTIR, mŏn'ȧ-stēr'. A fortified seaport on the east coast of Tunis, 65 miles southeast of the city of Tunis. It is surrounded by a strong wall crowned with towers and has a number of mosques and a normal school established by the French. The chief manufactures are soap and oil, but its trade is declining. Pop., about 6000. Monastir is the ancient Ruspina.

MONASTIR, or BITOLIA. An important city in the extreme southern part of Servia, 15 miles from the Greek frontier. It is located in a broad valley of the Nije Mountains, 85 miles northwest of Saloniki, with which it is connected by rail (Map: Balkan Peninsula, C 4), and, of all Servian cities, ranks next to Belgrade in population. It is an important garrison town, with large barracks, military hospital, arsenal, etc. There are several mosques, a school of arts and sciences, and other educational institutions. The town carries on a large trade in wheat, tobacco, woolens, and skins, and makes gold and silver ware and carpets. Until the Balkan War (q.v.), Monastir was the capital of the Vilayet of Monastir in the Ottoman Empire. It surrendered to the Servians on Nov. 18, 1912, and was confirmed to them by the treaties of London and Bucharest (1913). Pop., 1905, about 60,000, of whom the majority are Mohammedans and Christian Bulgarians.

MONAUL, mō-nąl'. The Anglo-Indian name for any of the gorgeously plumaged and crested pheasants of the genus *Lophophorus*, commonly known as Impeyans, which inhabit the forests of the Himalayas. The three species are objects of sport, and their skins were formerly in demand for millinery. Stringent game laws now protect the birds from wholesale slaughter and exportation for this purpose in all locations where the British have influence.

MON'AZITE (from Gk. *μονάζειν, monazein*, to be solitary, from *μόνος, monos*, single). A phosphate of the cerium group of metals, principally cerium, lanthanum, and didymium, with varying amounts of thoria and silica. It is yellow, red, or reddish brown in color, has a resinous lustre, and crystallizes in the monoclinic system, the crystal individuals measuring only a fraction of an inch in length. Monazite is commercially valuable owing to its containing thorium, which is utilized in the form of oxide in the manufacture of Welsbach and other gas mantles. The cerium obtained from the separation of the metallic oxides is employed as cerium oxalate in pharmacy. Monazite occurs in association with the older crystalline rocks, especially granite and gneiss, in the southern Appalachians, Brazil, Norway, Silesia, and Russia, but the only important sources of the mineral are North Carolina and Brazil. The deposits in North Carolina are of placer nature and occur along the channels of the streams which have concentrated the heavier minerals in the lower layers of the sands and gravels. In Brazil the deposits are found along the seashore. The monazite is obtained by washing the sands and gravels in sluices, a process similar to gold washing. The concentrates thus obtained contain from 70 to 90 per cent of monazite, with 1.587 per cent of thoria. The output of monazite in the United States in 1912 was 1272 pounds, valued at $159. Importation in 1911, $215,700; in 1913, $87,000; chiefly from Brazil.

MONBOD'DO, JAMES BURNETT, LORD (so called, by Scottish custom, as Lord of Session) (1714–99). A Scottish judge and author, born at Monboddo, Kincardineshire. He was educated at Marischal College, Aberdeen, at Edinburgh, and, in civil law, at Groningen and was admitted a member of the Faculty of Advocates at Edinburgh in 1737. He prepared a collection of the *Decisions of the Lords of Council and Session* (1826; in Brown's *Supplement to the Dictionary of Decisions*). He was, however, far better known as a littérateur, in particular through his *Origin and Progress of Language* (6 vols., 1773–92) and *Ancient Metaphysics* (6 vols., 1779–99), in defense respectively of Greek literature and Greek philosophy, both erudite, formerly ridiculed for their eccentricities and paradoxes and now generally regarded as singularly acute in their observations and scientifically in advance of their time.

MONBUTTU, mŏn-bụt'tōō, or MANGBATTU. A country in Central Africa, between lat. 3° and 4° N. and long. 28° and 29° E., containing about 4000 square miles, with a population once estimated at 1,500,000 (Map: Congo, E 2). It is an elevated table-land, 2500 feet above the sea, and through it the Kibaly and Gadda rivers flow to form the Welle. The soil (producing tobacco, sugar cane, sesame) is fruitful, needing little cultivation. The inhabitants are cannibals of chocolate color, practicing polygamy and circumcision and wearing garments made of bark cloth. They are skillful smiths. Since Schweinfurth visited their powerful and populous kingdom, it is said to have been almost depopulated by slave traders and Mahdists.

MONCADA, mŏn-kä'dȧ, FRANCISCO DE, CONDE DE OSUNA, MARQUÉS DE AITONA (1586–1635). A Spanish diplomat, soldier, and historian, born at Valencia. At first Ambassador at the court of the Emperor Ferdinand II, he was in 1633 appointed generalissimo of the Spanish forces in the Netherlands and twice defeated the Prince of Orange. He published a work of considerable historical value entitled *Expedición de los Catalanes y Aragoneses contra Turcos y Griegos* 1623), which has frequently been reprinted (e.g., vol. xxi of the *Biblioteca de autores españoles*, edited and annotated by Gayetano Rosell, 1852). G. Schlumberger published *Expédition des "Almugavares" ou Routiers catalans en Orient de l'an 1302 à l'an 1311* (Paris, 1903).

MONCALIERI, mŏn'kȧ-lyā'rē. A town in the Province of Turin, Italy, situated on the right bank of the Po, 5 miles south of Turin. The Royal Palace, built in 1470, has a picture gallery. The town has many beautiful villas, a fourteenth-century church, a Gymnasium, a meteorological institute, a theatre, brick and lime kilns, and manufactures matches. Pop. (commune), 1901, 11,561; 1911, 12,925.

MONCEAUX, môN'sō', PARC DE. A Paris park, attractively laid out in 1778 by the Duke of Orléans, afterward known as Philippe Egalité, which became a fashionable resort and a favorite place for fêtes and balls. It became national property during the Revolution, was restored to the Orléans family at the Restoration, and was finally purchased by the city of Paris and converted into a public park.

MONCEY, môN'sā', BON ADRIEN JEANNOT DE, DUKE OF CONEGLIANO (1754–1842). A French soldier, born at Moncey (Doubs). He took an active part in the campaign of the Pyrenees in 1794 and was made a general in the same year. In the Italian campaign of 1800–01 he greatly distinguished himself, became marshal of the Empire in 1804, and after his return to France received the title of Duke of Conegliano (1808) and the grand cordon of the Legion of Honor. In the succeeding war with Spain he fought brilliantly, especially at Saragossa in 1809. Moncey advised against the invasion of Russia and did not accompany the army thither in 1812, but he was prominent in the defense of Paris against the allied forces in 1814. Louis XVIII made him a peer, and Moncey remained neutral during the events of the Hundred Days. His refusal of the presidency of the Council deputed to try Marshal Ney lost him all his honors, but a year later, after a brief imprisonment, these were returned to him. He made his last active campaign in Spain in 1823. In 1833 he was made governor of the Invalides.

MONCK, mŭnk, CHARLES STANLEY, fourth VISCOUNT (1819–94). A British administrator, born at Templemore, County Tipperary, Ireland. He graduated at Trinity College, Dublin, in 1841 and was called to the Irish bar in the same year. He was elected to Parliament as a Liberal member for Portsmouth in 1852 and was reëlected in 1855, but was unsuccessful in 1859. He was a Lord of the Treasury from 1855 to 1858 and was appointed Governor-General of Canada in 1861. At this time the legislative union of 1841 was breaking down, and in 1864 government was practically at a deadlock. Public men were looking to a confederation to solve the problems of Canadian politics. Monck's tactful management and conciliatory temper were an important factor in the crisis. Largely by his efforts the reform leader, George Brown (q.v.), was induced in 1864 to enter the famous coalition ministry which carried on the government while the plans for confederation were being put into effect. Monck had to a certain extent initiated and encouraged those plans and did much to bring them to completion. He was therefore reappointed Governor-General in 1867 on the confederation of the provinces into the Dominion, but resigned the next year. In 1871 he served on the Irish national education commission and on the commission to carry out the act for the disestablishment of the Irish church. In 1882 he was appointed on the commission for administering the Irish Land Act, but retired two years later. He succeeded his father as Viscount in the Irish peerage in 1849 and was made Viscount in the peerage of Great Britain in 1866.

MONCK, GEORGE. See MONK, GEORGE.

MONCKTON, RICHARD, BARON. See MILNES, RICHARD MONCKTON, BARON HOUGHTON.

MONCLOVA, mŏn-klō'vȧ. A town of the State of Coahuila, Mexico, situated 103 miles northwest of the capital, Saltillo, on the National Railways of Mexico, and the terminus of a branch line to Cuatro Cienegas (Map: Mexico, H 4). It is the centre of an agricultural and stock-raising district and contains some railroad shops and a big cotton factory. Monclova was settled during the last quarter of the seventeenth century and was important as the starting point for the early Spanish entradas into Texas. Under their rule it continued to be the seat of government for this portion of New Spain and during a brief period was the capital of the dual State of Coahuila and Texas. Pop., 1900, 6684; 1910, 6872.

MONCRIEFF, mŏn-krēf′, William Thomas (1794–1857). An English dramatist, born in London, son of a Strand tradesman named Thomas. The name Moncrieff he assumed for theatrical purposes. Moncrieff's first success was at Ashley's with *The Dandy Family;* and in 1820 *The Lear of Private Life*, with Junius Brutus Booth as hero, enjoyed a long run. But his most popular production was *Tom and Jerry* (1821), a dramatization of *Life in London* by Pierce Egan (q.v.), whose *Boxiana* Moncrieff had begun to publish in 1818. He managed Vauxhall Gardens in 1827 and in 1833 leased the City Theatre. Soon afterward his sight failed, and in 1843 he became totally blind. The following year he entered the Charterhouse in London. Moncrieff's theatrical reminiscences were published in the *Sunday Times* in 1851. He edited *Selections from Dramatic Works* (London, 1850), containing 24 of his own plays.

MONCRIEFF PITS. Excavations used in the system of gun mounting originated by Sir Alexander Moncrieff (1829–1906) for the heavy ordnance of coast batteries, first introduced about 1868. This system utilizes the stored energy of the recoil of the gun to the loading position to return it to the firing position. The Crozier-Buffington disappearing gun carriage, used in the United States Coast Artillery, is the modern example of this type of gun mount. The return to firing position is accomplished by the fall of weights previously raised by the recoil of the gun. See Ordnance.

MONCTON, mŭnk′ton. A town and port of entry in Westmoreland County, New Brunswick, Canada, on the Petitcodiac River, which flows into the Bay of Fundy, and the Intercolonial, National Transcontinental, and the Moncton and Buctouche railroads, 89 miles northeast of St. John (Map: New Brunswick, E 2). It is at the head of river navigation and has a fine harbor. There is a difference of 30 feet between high and low tides. The town possesses two parks. It manufactures cotton, flour, planing-mill products, leather, underwear, hats and caps, builders' materials, aërated waters, biscuits, barrels, mattresses, wire fences, foundry and machine-shop products, and wooden ware. The general offices and principal shops of the Intercolonial Railroad, and also the railway yards and shops of the National Transcontinental, are located here, and there is a large trade in lumber and agricultural products. Oil and natural gas are found in the vicinity, 20 gas wells yielding over 50,000,000 feet of gas daily. The United States is represented by a commercial agent. Pop., 1901, 9026; 1911, 11,345.

MOND, mŏnd, *Ger. pron.* mŏnt, Ludwig (1839–1909). A German chemist, born at Cassel, where he attended the Polytechnic School. He finished his education at the universities of Marburg and Heidelberg. In 1862 he went to England, where he was employed in a Leblanc soda manufactory, and in that connection worked out his method of recovering the sulphur that had been lost as calcium sulphide in the Leblanc soda process. Two years later he erected a similar manufactory at Utrecht. In 1867 he again returned to England, where he lived thenceforth. In 1873 he established, with Sir John Brunner as partner, a large manufactory of alkali, employing the Solvay process. He greatly improved the ammonia process of making bleaching powder and solved the problem of recovering chlorine lost in the form of chloride of calcium. (See Soda.) One use to which he put part of his great wealth was the founding in 1896 of the David Faraday Laboratory of the Royal Institution, London. He made a large collection of paintings, which are described in *The Mond Collection*, by J. P. Richter (2 vols., 1910).

MONDOÑEDO, mŏn′dō-nyā′dō. A town of northwest Spain, in the Province of Lugo, situated in a mountain valley 12 miles from the Biscayan coast (Map: Spain, B 1). It was anciently an important town. It has a cathedral begun in the thirteenth century, with a baroque façade, and then restored in the seventeenth century. There are marble quarries in the neighborhood. The town manufactures cotton and linen fabrics. Pop., 1900, 10,619; 1910, 9725.

MONDOVÌ, mŏn′dō-vē′. An episcopal town in the Province of Cuneo, Italy, on the Ellero, a branch of the Po, 42 miles south of Turin (Map: Italy, A 2). It had a university from 1560 to 1719. Among its notable structures are the cathedral of San Donato, dating from 1450, a citadel with a Gothic tower, erected in 1573, a royal lyceum, and a bishop's palace. There are three public libraries. Its educational institutions include an industrial school and a technical institute. Near by is a chapel built by Vittozzi, containing the remains of Charles Emmanuel I. There are manufactures of machinery, cloth, silk, paper, books, and earthenware. At the battle of Mondovì, on April 21, 1796, the Sardinians were totally defeated by the French. Pop. (commune), 1901, 19,255; 1911, 19,593.

MONEL (mŏn′el) **METAL.** See Nickel.

MO′NER (from Neo-Lat. *moneron*, from Gk. *μονήρης, monērēs*, solitary, from *μόνος, monos*, single + *ἀραρίνκειν, ararinkein*, to join). The simplest form of Protozoa and the nearest to what may have been the most primitive living being. The Monera of Haeckel differ from the rhizopods (Amœba, etc.) in wanting a nucleus and contractile vesicles. Their body substance is homogeneous throughout, not divided into a tenacious outer and soft inner mass, as in Amœba. They move by the contraction of the body and the irregular protrusion of portions of the body, forming either simple processes (pseudopodia) or a network of gelatinous threads. The food, as some diatom, desmid, or protozoan, is swallowed whole, being surrounded and engulfed by the body, and the protoplasmic matter then absorbed. The simplest form known, and supposed to be really a living being, is Haeckel's Protamœba. It is like an amœba, but is not known to have a nucleus and vacuoles. It reproduces by simple self-division, much as in Amœba. The individual moner—e.g., Protamœba—is simply a speck or drop of transparent, often colorless, viscid fluid. This drop of protoplasm has the power of absorbing the protoplasm of other living beings, and thus of increasing in size—i.e., growing; and in taking its food makes various movements, one or more parts of its body being more movable than others, the faculty of motion thus being for the moment specialized; it has apparently the power of selecting one kind of food in preference to another and, finally, of reproducing its kind by a process not only of simple self-division, but also of germ production. Consult Ernst Haeckel, *History of Creation*, revised by E. R. Lankester

(4th ed., 2 vols., New York, 1906). See PROTISTA.

MONESSEN, mō-nĕs′n. A borough in Westmoreland Co., Pa., 39 miles by rail south of Pittsburgh, on the Monongahela River, and on the Pennsylvania and the Pittsburgh and Lake Erie railroads (Map: Pennsylvania, B 7). There are large steel and sheet and tin plate works, foundries and machine shops, a wire-fence factory, lumber yards, box factory, brewery, and brickworks, the products of which are shipped in large quantities. A bridge spans the river at this point. The growth of Monessen has been rapid. Pop., 1900. 2197; 1910, 11,775; 1914 (U. S. est.) 18,752; 1920, 18,179.

MONESTIER, mō′nĕs′tyā′, JEAN (1855–). A French civil engineer, born at Saint-Rome (Lozère). He became president of the Council of Lozère and chief engineer of bridges and highways. For a time he was Minister of Public Works and engineer of the Seine department. He was made Officer of the Legion of Honor.

MONET, mō′nā′, CLAUDE (1840–). A French landscape painter, the leader of the Impressionist school which gained its name from his painting "Impression, Rising Sun," exhibited in 1874. He was born in Paris, Nov. 14, 1840. When a youth he entered the atelier of the Classicist Gleyre, but lack of sympathy with the style of work executed there caused his withdrawal. In the beginning his fancy was strongly drawn to the work of Courbet and Corot, and certain mannerisms, which disappeared with increasing years, indicate the influence of the Barbizon school. To a certain extent he is indebted also to Manet and the Japanese. He, however, admitted no master and for the most part drew his inspiration directly from nature, apparently caring little for subject, detail, or composition. His aim is chiefly to reproduce the effects of light and air, to portray the fleeting aspect of things. To Monet the effects of complementary contrasts and color mixtures are so distinctive and certain that to those not similarly trained his representation of them appears affected and exaggerated, but when seen under subdued light and from the requisite point of distance, they show great excellence. For over 20 years he struggled against ridicule and hostile criticism before his artistic ideas were accepted. Part of that time he spent in Holland, England, and Italy before finally taking up his residence at Giverny, France. His earlier style may be studied in "The Breakfast" (Luxembourg), "Camille," "Fontainebleau Forest" (1866), "Vessels Leaving Havre" (1868), and many landscapes produced before 1875, nine of which are in the Moreau-Nelaton collection, Musée des Arts Decoratifs (Louvre). Among his later works may be mentioned: "Bordighera"—the town in the half distance, led up to by a foliaged foreground; "The Orchard"—a landscape, vibrating with light and showing well the possibilities of Monet's use of pure color; "The Sun in a Fog, Waterloo Bridge" (1904); "Palazzo Dario, Venice" (1908). "The Church of Vétheuil," "The Rocks of Belle Isle," "Saint-Lazare Station," and six other paintings are in the Luxembourg. Monet's art reached its fullest expression in his series of variations of the same theme, as in "Rouen Cathedral" (Luxembourg), "Water Lilies," and "Views of the Thames," which present a wonderful analysis of light. Consult: Théodore Duret, *Le peintre Claude Monet* (Paris, 1878), English translation, *Monet and the French Impressionists* (London, 1912); J. C. Van Dyke, in *Modern French Masters* (New York, 1896); W. H. Fuller, *Monet and his Paintings* (ib., 1899).

MONETA, mō-nā′tà, ERNESTO TEODORO (1833–). An Italian journalist and pacifist. He was born in Milan, where his father was a prominent patriot. As a boy he took part in the Milan uprising of 1848. He was a general-staff officer in Garibaldi's army and in 1861–67 served in the Italian army. He had been editor of *La Libera Parola*, a Turin journal, in 1860–61, and from 1867 to 1896 was director of the great Milan National-Democratic newspaper *Il Secolo*. About 1870 he became interested in the movement for international peace and formed peace societies in northern Italy, notably the Comice Internationale of Milan in 1878 and the Unione Lombarda in 1887. He was an Italian delegate to several peace congresses and in 1906 was president of the International Congress held in Milan. The next year he received the Nobel peace prize in special recognition of his book *Le guerre, le insurrezione, e la pace nel secolo XIX* (3 vols., 1903 et seq.). Moneta was made a member of the Carnegie Consultative Council. He edited *La Vita Internazionale* (1897 et seq.) and the *Almanaco pro pace*.

MON′ETARY COMMISSION OF THE UNITED STATES CONGRESS. The fall in the value of silver after 1873 was the source of much debate in the Forty-fourth Congress, and in August, 1876, a joint resolution was passed for the appointment of a commission of three Senators and three Representatives, together with experts chosen by the former, to inquire into: (1) the causes and economic effects of the decline in silver; (2) the policy of restoring the double standard; (3) the policy of retaining in circulation the legal-tender notes; and (4) the best means for resuming specie payments. The commission as organized consisted of Senators John P. Jones, Lewis V. Bogy, and George S. Boutwell; Representatives Randall L. Gibson, George Willard, and Richard P. Bland. William S. Groesbeck, of Ohio, and Prof. Francis Bowen, of Massachusetts, were the expert members of the commission, and George M. Weston, of Maine, was appointed its secretary. The meetings of the commission were held in New York and Washington in the winter of 1876–77. The majority report of the commission declared that the recent production of silver relatively to gold had not been greater than formerly, but that the decline in the value of silver had resulted mainly from the demonetization of silver in Germany, the United States, and the Scandinavian states, the closure of the mints of Europe to its coinage, the temporary diminution of the Asiatic demand, the exaggeration of the yield of the Nevada silver mines, and the fear of further action against silver coinage by the governments. The policy of adopting the gold standard was condemned in severe terms, and the unrestricted coinage of both metals was recommended. The report further stated that an attempt to introduce monometallism would result in a ruinous contest for a gold standard with the European nations, while, if silver were remonetized by the United States, the effect would be to attract that metal from other countries while it was cheap, in exchange for what the United States had to export; and that the

latter country would thus have the benefit of the rise which the commission believed would take place in its value when the temporary causes of its depression had passed. Boutwell made a minority report against remonetization of silver except on the basis of international agreement, and Prof. Francis Bowen dissented from the majority report, arguing in general for the gold basis, but declaring in favor of the remonetization of silver on adding to the quantity of pure silver in a dollar enough to make its bullion value equal to the then value of a gold dollar.

The government published a summary of this report, together with papers prepared for the commission on "Asiatic Trade and Flow of Silver to the East," "Constitutional Powers of Congress and the States with Respect to Metallic Money," "Legislation on Subsidiary Silver Coin," and "The Trade Dollar." In addition to these the government published a collection of valuable statistics gathered by the commission relating to the production, distribution, and relative value of the two metals and to the monetary systems of foreign countries.

MONETARY CONFERENCES, INTERNATIONAL. Conferences between representatives of the United States and various European Powers for the discussion of united action with reference to monetary matters were held in 1867, 1878, 1881, and 1892.

France, on completing the Latin Monetary Union (q.v.), indulged in the hope that other nations might join the union and brought the matter to the attention of other governments through diplomatic channels. France called the conference of 1867 during the exposition of that year with the thought of furthering this project. Nineteen states were represented at the conference. The first question debated was whether an existing system or a wholly new one was best adapted to secure international coinage. The answer was in favor of an existing system, and it was admitted that the system of the Latin Union would probably be best adapted to this purpose. A second question was: "Is there a possibility of establishing at this time identities or partial coincidences of monetary types on a wide scale, on the basis and with the condition of the adoption of the silver standard exclusively?" A third question repeats this inquiry for the gold standard exclusively, and a fourth for the double standards with a common ratio. These questions were discussed together, but the debate was not properly one of standards. The conference declared unanimously in favor of the gold standard as a basis of an international coinage. But in this conference the whole question of standards was incidental. Whether a unit should be adopted for all the nations or whether coincidences in the value of the coins should be effected were the most important questions considered. Finally, a resolution was adopted that all gold coins which were multiples of five francs should have legal circulation in all the contracting states. The work seemed to be complete, and the conference adjourned with mutual congratulations; but there the matter ended, as no treaties to carry out the plans were contracted.

Quite different was the purpose of the conferences of 1878, 1881, and 1892. A fall in the value of silver as compared with gold had taken place, and the silver currency threatened to depreciate seriously and perhaps endanger the monetary systems of those countries in which the double standard existed. In 1867 the ratio between silver and gold, which for many years had been below the French ratio of 1 to 15½, rose above it, and in 1874 rose above the American ratio of 1 to 16, and by 1878 had reached 1 to 17.94. In the meantime prices had begun to fall. The initiative for the conference of 1878 proceeded from the United States. The coinage law of February of that year authorized the President to invite "the governments of the countries composing the Latin Union so called, and of such other European nations as he may deem advisable, to join the United States in a conference to adopt a common ratio between gold and silver, for the purpose of establishing, internationally, the use of bimetallic money, and securing fixity of relative value between those metals." In response to the invitation of the United States the principal nations except Germany sent representatives to the conference, which met in Paris in August, 1878. Considerable solicitude was expressed at the conference lest silver should be wholly discarded, though no agreement could be reached on bimetallism. This in particular was the attitude of Great Britain, concerned as she was for the currency of India. The most bitter hostility to bimetallism was exhibited by Belgium and Switzerland, while France, their partner in the Latin Union, was distinctly in favor of it. In its advocacy of the principle the United States was handicapped by the fact that it was on a paper basis and that it was a producer of silver. The proposals of the United States were rejected, the European nations uniting in the declaration "that it is necessary to maintain in the world the monetary functions of silver as well as those of gold, but that the selection for use of one or of the other of the two metals, or of both simultaneously, should be governed by the special position of each state or of each group of states." The conference was thus without result.

In 1881 another conference was held at Paris. Events were rapidly proving that the alleged scarcity of gold was a fact. The United States began to import gold, and this drew upon the European stock. The Bank of England saw its gold reserves diminish and seemed unable to check the outflow. In France the reserve of gold in the Bank declined, while silver increased. As the proportion of silver in the metallic reserve increased doubts began to be expressed whether gold payments would be maintained. Germany saw the completion of her monetary reform indefinitely postponed by her inability to sell her stock of silver coin except at a great sacrifice. In the United States the pressure for free silver continued. France was the prime mover in this conference, though the United States joined in issuing the invitations. Great Britain exhibited great reserve in the conference, and the delegates of other states declared themselves bound by strict instructions. The discussions were able and learned, but fruitless, and the conference adjourned without result.

It was not until 1892 that another effort was made to effect monetary reform by means of a conference. In 1891 the President was authorized to call a conference. Great Britain exhibited more interest than usual, and while she declined to join a conference whose only object was the discussion of bimetallism, consented to take part in a conference to discuss an enlarged

monetary use of silver. The British government appointed delegates in sympathy with bimetallic proposals and sanctioned the appointment of pronounced bimetallists by the government of India.

The reception of the proposals of the United States on the continent of Europe was less cordial. France was especially lukewarm and did not accept the proposal that the conference should be held at Paris. Arrangements were finally made for a meeting at Brussels. Germany was noncommittal, but consented to be represented at the conference. England and the United States, as it appeared, were to be the moving forces in this conference. All was in readiness for a meeting in May, 1892, when the fear of cholera in Europe caused its postponement to November.

This delay was fatal, for in the meantime two political events had occurred which altered the attitude of the leading nations. In England the Conservative party was overthrown and gave place to the Liberals, who had little sympathy with bimetallism. The new ministry added to the delegation two men who were avowed opponents of bimetallism. In the United States the election of 1892 resulted in the defeat of the party in power. Under these circumstances the delegation from the United States could not make any binding promises for the incoming administration. Accordingly the conference had little promise of success. When it met it was proposed to discuss any plans for enlarging the use of silver, especially such as might be proposed in the conference before taking up the subject of bimetallism. This was a programme of discussion rather than of action, and after some 12 sessions of fruitless debate the conference adjourned without any action.

Consult the reports of the conferences—that for 1867 being included in the appendix of that of 1878—issued by the United States government, and H. B. Russell, *International Monetary Conferences* (New York, 1898), in which the events leading up to the conferences are carefully portrayed. See also bibliography under MONEY.

MONETT, mŏ-nĕt'. A city in Barry Co., Mo., 44 miles west of Springfield, on the St. Louis and San Francisco Railroad (Map: Missouri, C 5). The city is engaged in farming and stock raising. The commission form of government was adopted in March, 1914. Pop., 1900, 3115; 1910, 4177.

MONEY (OF. *moneie, monoie, monnoye,* Fr. *monnaie,* from Lat. *moneta,* money, mint, from *Moneta,* an epithet of Juno, in whose temple at Rome money was coined, from *monere,* to warn, connected with *meminisse,* to remember, Gk. *μέριμνος, merimnos,* anxious, Skt. *smar,* to remember). The medium of exchange and measure of value. Whatever fills these functions, however crudely, is money. Of all the substances which have been used as money, gold and silver take the first place, and the discussion of money usually has these in view. It is well to remember, however, that some of the humbler functions of money are to-day performed by nickel and copper, and that in times past not only other metals, tin, lead, iron, and platinum, have been used as money, but also, especially among primitive peoples, a wide variety of other objects. Jevons enumerates, among other things, furs, skins, leather, sheep, cattle, wampum, cowries, grains, olive oil, tobacco, and salt, as being in use at one time or another for this purpose. Primitive as these may be, the enumeration seems to emphasize the fact that it is not a substance per se that we designate as money, but a substance invested with a certain utility.

So important is this function in modern life that we cannot readily conceive of a society without some mechanism to perform it. And indeed from the earliest days of recorded history we find references to money, and there are few among the primitive peoples of our own time which do not possess it in rudimentary form. The difference between the highly civilized nations of modern Europe and America and their early progenitors or the savage tribes of Africa does not consist so much in the fact that we use money and they do not, as in the extent to which it is used. Even though money is recorded as known among the most primitive peoples, it is then of only occasional use, it does not penetrate into every relation of social life. Peoples whose social organization is based upon slavery and patriarchal conditions have little need for money, nor is the need great among a pastoral or agricultural people when there is little differentiation of occupation. On the other hand, among highly organized industrial peoples where nearly all produce not for individual needs but for sale in the market, money is in constant and universal demand.

The primary function of money is that of a medium of exchange; and if in the theory of money to-day this characteristic receives scant notice, it is not because it is not fundamentally important, but rather because it is comprehended with comparative ease. Other functions are all derived from the primary function, medium of exchange.

Whatever the substance used as money may be it becomes an object of universal desire. In primitive society the most widely desired object came to be used as money. The fact that an object is universally desired fits it in the first instance for use as money, but after it acquires that function it is desired not chiefly for its own sake but for its command over other things. At an early date the desire for personal adornment singled out the precious metals as money par excellence, but at the present time it is not because gold is beautiful that we desire it, but because as money it procures for us whatever we may desire.

In the second place, money is the measure of value. The acts of buying and selling fix upon the objects bought and sold relative values, and it was only a slight step to extend the conception of value to things not sold or bought, or which are not intended for sale. All things capable of sale can be valued in terms of money. All credit operations depend upon this fact. Since the value of the money in use in any society is insignificant as compared with its total wealth valued in terms of money, it has been argued that the function of money as a measure of value is far more important than its function as a medium of exchange. And in fact the further we get away from primitive conditions of trading, the more important does this derivative function become. When all wealth is valued in terms of money barter of a higher order becomes possible. In the new form of barter, however, the exchange of commodities is indirect. Modern commerce is largely based upon it, and while it is most ap-

parent in international trade, where balances only are settled by the transfer of money, it is no less widespread and fundamental in domestic trade. See BANK, BANKING; CREDIT.

From the function of a measure of value is derived a subordinate function of the greatest practical importance, viz., the function of money as a standard of value. A standard of value is simply a measure by which values at different periods are compared. The measure of value contemplates the estimation of commodities at the same time; the standard of value, their estimation at different times. The standard of value is often called the standard of deferred payments. Credit organization involves future payments. These payments are expressed in money and present goods are transferred for a promise to pay money in the future. In the ordinary transactions of mercantile life the futurity contemplated is not far distant, but in many operations, both public and private, a lapse of years is contemplated. In such contracts stability in the value of money is of the highest importance; and were it not that money has been subject to certain variations, it is quite possible that it would not have been found necessary to differentiate this function from that of a measure of value.

The substances which at various times in the world's history have fulfilled these several functions have not performed the office equally well, and gradually all except gold, silver, certain minor metals, and paper have been eliminated among advanced nations. The selection of the precious metals for this purpose is due in part to certain physical characteristics and in part to economic conditions. In the first place, they are durable, and while it is true that there is always some loss through abrasion, the process is a remarkably slow one. Secondly, they are homogeneous and divisible. If a given quantity be divided into parts, those parts will be absolutely alike, and the sum of the parts will equal the whole. Finally, they are portable, since relatively to their weight they are of high value. Other objects such as precious stones excel the metals in portability, but they do not present the other necessary qualities of divisibility and homogeneity. Furthermore, it should be remarked that the metals are relatively stable in value, a result of their durability, since the existing stock is always so much greater than the annual output that violent fluctuations in supply are avoided. Some writers have insisted that the money substance should itself possess value, and have gone so far as to speak of the necessity of intrinsic or inherent value. The use of the word intrinsic evidently indicates a confusion of thought. These writers mean that the money substance should possess a utility apart from that which it gains by virtue of its money function. It may be true that no substance without utility could have become established as money, but this initial primary utility is insignificant after it has acquired the greater utility which attaches to it as a medium of exchange and measure of value.

It has already been noted that besides the precious metals which possess in a high degree the qualities named, other substances, minor metals and paper, are used as money among advanced peoples. The rôle of the former is quite subordinate. For use in minor exchanges they are sufficiently portable and they possess the other physical qualities named. Since their quantity is limited, and provision is usually made for convertibility into money made of the precious metals, their value is not less stable than that of gold and silver. The problems of paper money are more complicated, since it is used in far greater quantities and for large payments. In portability it excels the metals, and, while it is not literally indestructible or divisible, the ease of replacement of old notes by new, or one denomination by another, is a substitute for these qualities. Its intrinsic value, i.e., its utility for nonmonetary uses, is of course a negligible quantity. Far more important is the question of the stability of its value. This question we can answer only after an investigation of the laws which govern the value of money.

There are two explanations of the value of money, one that it is fixed by the law of supply and demand, the other that it is fixed by the costs of production. These are the general explanations of value and are complementary rather than antagonistic. The first is the law of market value, the second of normal value. In the case of freely reproducible goods, while market value may at a given moment vary from normal value, it cannot maintain such variation for any length of time. Money is in a less degree freely reproduced than most of the other goods with which it can be compared. We should, therefore, without neglecting the influence of the cost of production, expect to find that in the fixation of the value of money supply and demand are the dominant factors.

Before discussing what the supply of money and the demand for it are, it may be well to call attention to the way in which the value of money is expressed. The values of all commodities are expressed in money as prices. Conversely, the prices of commodities express the value of money. We speak of prices as high or low, but we might as well speak of money as cheap or dear. Money is cheap when prices are high, and is dear when prices are low. When wheat rises from 50 cents a bushel to $1 a bushel, we say it has risen in value, but we might also say that the wheat price of money has fallen, because in the first instance it required two bushels of wheat to secure a dollar in exchange and in the second instance only one bushel. Wheat in our illustration stands for commodities in general, and, while the rise in price of one commodity does not mean that money has fallen in value, yet if all commodities rise in price we cannot escape the conclusion that it has so fallen. Prices and the value of money are therefore reciprocals.

The supply of money is the amount of money in existence. This has led some writers to say that the value of money depends upon its quantity. Other things being equal, this is true; but it does not in itself furnish an adequate explanation of the value of money. Assuming that no other influences are at work, it must be admitted that any increase in the quantity of money will lower its value and that any decrease will enhance it. There is a certain money work to be performed, a certain volume of exchanges to be transacted. If the units of money are numerous, each transaction will call for a larger number of units than when the money units are relatively few. Every increase in the world's money supply has been followed by a rising in prices or a fall in the value of money. If the fall is not commensurate with the increase in

amount, it is because the quantity of money is not the exclusive factor in fixing the value of money. Monetary legislation endeavors to adjust supply to demand by providing an automatic regulation of the quantity of money. Under a metallic-currency system we usually find provisions for the free coinage of the standard money metal. Should money increase in value, i.e., should prices fall and thus reveal an inadequate supply, free coinage will in a measure correct this by attracting to monetary use such supplies of the metal as are available for this purpose. So far as nations using the same standard are concerned there is a natural flow of the metals from one country to another which prevents any undue deficit or redundancy in any one of the countries involved. This adjustment takes place automatically through the course of trade. When currency is redundant in any country, prices will be high in that country and imports will be large relatively to exports. The settlement of the resulting unfavorable balances will diminish the currency of the country where it was formerly redundant and so diminish prices. If money is scarce in any country, prices will be low, exports large relatively to imports, and the resulting favorable balances will bring gold into the country. It is obvious, therefore, that international trade speedily corrects any local excess or deficit.

A general excess or deficit in the money supply carries with it a certain correction also, but the operation is slower. If prices rise, showing a fall in the value of money, mining enterprises become less profitable, and the additions to the volume of money will tend to grow less. On the other hand, if prices fall, showing a rise in the value of money, mining enterprises become correspondingly profitable and capital will seek employment in them. This is likely to increase the production of the metals and by increasing the supply to check the rise in value. These effects will not be immediate, as capital has great inertia, and its withdrawal from one line of activity and transfer to another cannot be instantaneous.

The value of money, as of any other commodity, is immediately dependent upon supply and demand. The supply of money admits of easy definition; but the demand for money cannot be so precisely stated. It has been paraphrased as the amount of money work to be done, but this money work cannot be expressed in statistical statements. The elements which enter into it can, however, be stated. The most important and the positive element in the case is the volume of exchanges to be accomplished. Whatever increases the volume of exchanges increases the demand for money; whatever diminishes the volume diminishes the demand. Division of labor and the evolution of a money economy are the most important factors in this increase of the money demand. Without a commensurate increase of supply, prices under such conditions must fall. A diminution in the world's demand for money is not likely, but a diminution in the local demand, effecting a temporary rise of prices before the correcting influence of international trade is felt, may and does occur.

But the volume of the exchanges is only one of several elements in determining the demand for money. The first of these is the rapidity of monetary circulation, the second the use of credit, both of which economize the use of money. It is obvious that all simultaneous cash transactions require the use of different pieces of money. But the transactions of a day or a year are not simultaneous and the same piece of money may fill its functions as a medium of exchange many times. When the circulation is sluggish the demand for money for a given volume of exchanges is far greater than when it is rapid. Savings banks, e.g., serve to increase the rapidity of circulation. They gather up the savings of the poor which would otherwise be locked up, and restore this money to circulation. In countries where savings take the form of private hoards, as is largely the case in France, more money is required per capita than in Great Britain or the United States.

Far more important in its effect upon the money demand is the use of credit (q.v.), balances only being paid in money. The country storekeeper who takes from the farmer butter and eggs on account, paying in supplies as his customer's needs arise, furnishes a homely illustration of the way in which credit minimizes the demand for money. In the larger business world the trade relations are rarely of such great simplicity, but by the mechanism of centres of credit or banks the transactions of a town or of even larger areas are reduced to a mutual exchange of goods and debts are canceled without the intervention of money. Banks and clearing houses (see those articles) are the agencies by which credit is organized.

Supply and demand as affecting the value of money are not wholly unrelated phenomena, and the explanation of monetary changes cannot be found in one element without the other. An excess of supply stimulates demand and prevents prices from rising as high as they otherwise would. A diminution of supply slackens demand and prevents prices from falling as much as they otherwise would. This interaction of supply and demand prevents changes in the money supply from producing effects in the increase or decrease of prices commensurate with the changes in the volume of money. It modifies but does not obliterate the significance of such changes.

Having considered what fixes the value of metallic money, we are now ready for the question, what determines the value of paper money? Despite differences of detail, there are for the purpose of this discussion but two classes of paper money—convertible and inconvertible. The first is secondary money, representing metallic money and deriving its value from the latter; the second is itself primary money and, like all primary or standard money, derives its value from the relation of supply and demand.

Paper money in the first instance was purely secondary or representative money. It was practically a storage receipt for gold and silver. Such receipts calling for metallic money on demand could and did serve in lieu of the latter in making exchanges. Such money offers no theoretical difficulties. Its circulation is that of metallic money in another form. The advantage of such money is that it forms a convenient mode of avoiding the cumbersomeness of metallic money. This is the function of the gold and silver certificates issued by the United States government, each of which represents a corresponding quantity of metal in the United States Treasury, and whose presence in the monetary circulation does not in the slightest degree affect its volume.

But such certificates are not the only form of

representative paper money, nor the most important. The history of banking shows that the depositaries of metallic money soon learned that under normal conditions coin would not be demanded at any one time for the full amount of the outstanding notes or certificates, and that a considerably larger sum could be kept in circulation than the metallic reserve. They began, therefore, to issue notes in excess of the reserve without infringing upon the characteristics of convertibility in coin on demand. Such money is called by the economists bank money, and it is immaterial whether it is issued by banks or by the government. Such money derives its value from the metallic currency upon which it is based, but, unlike the certificates already described, it enlarges the volume of the monetary circulation. The issue of such money economizes the use of the metals, and, in so far as it substitutes an inexpensive for an expensive substance as money, is a saving of wealth to the community.

If the principle of convertibility is not maintained, bank money becomes paper money pure and simple. It has usually been by the failure of banks or of governments to maintain the promise of redemption that such money has arisen. When this takes place paper money falls in value, or, as it is usually expressed, coin is at a premium. This would not of itself cause a disappearance of coin, but it usually happens that paper money is so multiplied in volume that coin disappears and paper becomes the sole standard. This substitution takes place by virtue of Gresham's law (q.v.). Such changes from a metallic to a paper currency are not effected without violent convulsions and much suffering; but there can be no doubt that, however ill it does the work, paper money under such circumstances performs all the functions of a medium of exchange, a measure of value, and a standard of deferred payments. Its value, like that of other money, depends upon its quantity in relation to the demand for money. As its quantity is likely to be increased without reference to the demands of trade in response to the fiscal necessities of the government, its value is unstable and uncertain. But this is not inherent in the nature of paper money; and there may be conditions, as in Austria during the greater part of the nineteenth century, under which paper money maintains a relative stability in value.

The adjustment of the monetary circulation to the needs of trade has given rise to composite money systems, in which, whatever may be the standard, gold, silver, and paper are usually combined. Under a single gold standard paper is generally used for larger payments, while silver is used for the smaller. Both are representative money in such cases. Silver is issued as token coinage. A token coin is one whose bullion value is less than its face value and whose legal power to pay debts is limited. Such coins are issued by government authority only, and pass current at their nominal values by virtue of legal enactment. In a well-ordered system, provision is usually made for the redemption of such coins in standard money when presented in specified quantities. Of such nature are the fractional silver coins of the United States and the minor coinage.

Under a single silver standard there is no theoretical reason why gold tokens should not be used for larger payments, but there is the practical reason that gold is expensive and that it is not absolutely necessary for such payments to be made in metal. Under such a standard as prevailed in Germany before 1873, paper is used for larger payments, and it was one of the objections to such a silver standard that it afforded so wide a scope for the issue of paper money.

Before the introduction of token coins nations had for centuries endeavored to secure the concurrent circulation of gold and silver under a system of bimetallism. Under such a system, if the market ratio between the two metals diverged from the legal ratio one of the metals was certain to be exported. When this occurred it always occasioned much distress if the silver were the metal exported, for it robbed the people of the small change of daily life. Hence we find among the nations which clung the longest to the bimetallic theory, that before it was abandoned measures had been taken to reduce the minor silver coins to the character of tokens in order that they might not be withdrawn from the country for export. With the introduction of token coinage and the adoption of the plan of issuing certificates to represent the larger coins the discussion of bimetallism assumed quite a different aspect. The arguments drawn from the difficulty of insuring the circulation of silver were almost entirely excluded from the discussion, which then centred upon the question whether gold alone or gold and silver in combination, provided the combination could be kept intact, furnished the better standard of value. See BIMETALLISM.

History of Money in the United States. The situation in which the early colonists in America found themselves was such that they could draw little from the monetary experience of the mother country. During the Colonial period they took from the mother country the designations pounds, shillings, and pence. Having no mines, their stock of money had to be imported, and since they drew more wealth from England than they could export to that country, it was quite impossible to accumulate a monetary stock in this way. The little that was brought over by the colonists soon found its way back to the mother country, and, in the early days especially, resort was had to various shifts to remedy the dearth of money. Various articles of food and produce were made receivable for taxes and other purposes. Of these the most widely known was the tobacco currency of Maryland and Virginia. In some of the Colonies resort was had to the wampum currency of the Indians. But far more important in their effects were the measures taken to prevent coin from leaving the country and the issue of paper money. One of the early devices resorted to was to give the English currency a higher nominal value than its face value. It was argued that, if in the Colonies a shilling piece circulated as one and a half shillings, it would not be exported. This process of rating coins had been used frequently in England for the gold coinage. The different Colonies acting independently rated the shilling at different values, and the result was a series of Colonial pounds differing from each other and from the English pound. In 1706 a proclamation of Queen Anne put a stop to this practice and fixed the nominal value of the pound in each of the Colonies at the existing rate. While the money of account was for each Colony a Colonial pound, the actual money in circulation was a motley collection of coins of

English, French, Portuguese, and Spanish origin. The Spanish dollar was the most widely known and circulated, and it thus became the term by which the currencies of the Colonies were most readily compared. In retail trade, locally in the United States, the shilling as a division of the dollar has persisted to our own day. Furthermore, as the Spanish dollar was common to all the Colonies, it was the term in which later the common obligations were expressed by the Continental Congress, and thus became the basis of our national coinage.

Of even greater importance in fixing the monetary habits of the people was the issue of paper money. The first issue was in 1690 in Massachusetts and was made to meet the expenses of an expedition against the French in Canada. The notes were received with reluctance by the people, and fell to a discount, which was removed by an act of the Colonial Legislature, which placed a premium on them, as compared with coin, in the payment of taxes. Then South Carolina issued bills in 1712, and in the first half of the eighteenth century all the Colonies followed these examples. Issued at first to meet extraordinary expenses of the governments, the public clamor for more money became so great that notes were issued later without any such plea in extenuation. In the situation of the Colonies the plea for more money to make trade easy was urged with peculiar force. In Massachusetts a series of issues had taken place; and in 1749 exchange upon London, which was normally 133 pounds Colonial for 100 pounds sterling, had risen to 1100 pounds for 100 pounds sterling. Parliament having voted £138,649 to reimburse the Colony for its share in the expedition against Louisburg, this sum was used by the Colony to redeem its paper issues at the rate of 11 to 1, and from that time onward Massachusetts was on a specie basis. Some of the Colonies, as, e.g., Rhode Island, North and South Carolina, had issued paper money far more extravagantly than Massachusetts; while others, notably Pennsylvania, had pursued a more conservative policy. In the latter Colony there were two kinds of bills—exchequer and loan bills. The first were issued by the Colonial Treasury in anticipation of taxes, but the amount outstanding is said not to have exceeded the probable receipts of two or three years. There were no sudden issues of large quantities and the amount of the issue was kept fairly uniform. The loan bills were issued to individuals on landed security, plate, or other valuable assets. With such security there was comparatively little danger of an overissue, and the records show that there were comparatively few bad debts.

In 1751 Parliament forbade the further issue of notes by the Colonies, and more or less successful efforts were made by them to redeem their outstanding notes. When, however, the Colonies united for their struggle with Great Britain the only fiscal resource which seemed open to them was the issue of paper money. The first issue was in August, 1775, for 300,000 Spanish dollars. Elaborate provision was made in the law for the redemption of this currency, and the amount fixed for which each Colony was held responsible. Other issues followed in rapid succession, and the pretense of redemption provisions was soon dropped. As much as nine millions was issued before any depreciation took place, but with the constantly expanding volume of the currency this could not last long. The following figures tell the story of the rapid multiplication and depreciation of this money:

			Price of a Spanish silver dollar in Continental currency
Issued 1776	20,064,464	January 1, 1777	1¼
Added 1777	26,426,333	" 1778	4
1778	66,965,269	" 1779	9
1779	149,703,856	" 1780	45
1780	82,908,320	" 1781	100
1781	11,408,095	" 1782	500
Total	357,476,337		

In the meantime every device known to the law was tried in vain to prevent the depreciation. The most stringent penalties enacted against those who refused to receive Continental money at its face value failed utterly to arrest the fall in value. Such enormous issues together with those of the several State governments practically destroyed the value of the paper money. As this paper was never redeemed, it was in effect a tax upon the people which caused much suffering and distress.

After the collapse of the Continental currency the circulation of the country consisted of specie, largely obtained through foreign loans, State notes, and, to a very limited extent, bank notes. In 1782 the Bank of North America, at Philadelphia, was chartered by the Continental Congress. It was a private institution with a large government subsidy and issued notes. It rendered important services to the nation, but its note issues amounted to only $400,000. Before the Federal Constitution was adopted banks of like character had been chartered in Boston, New York, and Baltimore, and bank issues acquired a recognized place in our monetary circulation.

The Federal Constitution vested the power to coin money in the central government and forbade the States making anything but gold and silver a legal tender for the payment of debt. This eliminated State issues, and from this time until the Civil War the monetary circulation consisted of United States specie, foreign specie, and bank notes.

Among the first acts of Congress was to declare the values at which foreign coins should circulate and be received at the government offices. Of these foreign coins the most common was the Spanish dollar, which as late as 1857 was received in all payments at the post offices of the United States. In 1792 a law was passed establishing a national gold and silver coinage. In the history of money prior to the gold discoveries of California specie played a subordinate part, its chief function being for small change and as a reserve for banking operations. We may therefore glance at the history of bank-note issues before taking up that of metallic currency.

While the Constitution debarred the States from issuing money, it did not prevent them from establishing banks and giving to the latter the power to issue notes as they might see fit. After the adoption of the Constitution State banks multiplied rapidly. In 1791 the Bank of the United States was chartered with a capital of $10,000,000. Its notes were received everywhere and were the natural medium of payments between different parts of the country. The bank acted as a controlling agent over the State banks, since by receiving or refusing to accept their notes it could make or mar their credit. When in 1811 its charter expired the

State banks were unrestrained in their issue of notes. In 1811 Gallatin estimated the note circulation of these banks at $46,000,000, but in 1814 it had swelled to $100,000,000, while trade was crippled by war and specie was drained from the country. Great embarrassment was felt by the government from the fact that as the only medium of exchange such State bank notes could hardly be refused in payments, while with the suspension of specie payments by the banks their value depended upon the vagaries of bank management. This state of affairs called loudly for a remedy, and the reorganization of the Bank of the United States was planned. It was eventually accomplished in 1816, and for 20 years it exercised on the whole a salutary influence upon the monetary circulation. When in 1836 its charter expired, State bank notes again ran riot and precipitated the disastrous panic of 1837. In the days of depression which followed the States generally put their banking systems in order. So long, however, as any State countenanced the loose methods which had formerly brought the whole system into disrepute, some were bound to suffer from such iniquity, but the mass of suffering was greatly reduced. This was in part due to the gold discoveries of California, which furnished the nation with a larger supply of metal than had ever been known and made it comparatively easy for the banks to maintain an adequate reserve. When the Civil War broke out the State bank system was at its best, and the agitation which culminated in 1863 in the national banking system had its origin more in the fiscal necessities of the government than in any immediate need of reform of the State banks.

The unit of value adopted in the Act of 1792 mentioned above was a dollar of 371¼ grains of pure silver—practically the Spanish dollar then current—or a gold dollar of 24.75 grains, thus providing a bimetallic system with free coinage of the two metals at a ratio of 15 to 1. There had not been for many years any material change in the production of the precious metals, and the ratio adopted corresponded fairly well with the market ratio. While no great quantity of metal was coined in the mints of the United States for the first 20 years of our history, and as before the outbreak of the War of 1812 the tide of importation was in our favor, the system worked satisfactorily. With the war and the heavy importations of merchandise which followed an export of specie began and it was found that gold was favored. This change in the market ratio was largely due to the outbreak of the revolt against the Spanish domination in South America and the slackening of supplies of silver from that region. Agitation began for a new ratio, which did not culminate in legislation until 1834. At this epoch the United States mined no silver, while a certain amount of gold, considerable for that time, was being drawn from the Appalachian gold region. When, therefore, the new ratio was adopted it was deemed wise to be upon the side of favoring gold rather than silver. Laws of 1834 and 1835 changing the weight and fineness of the coins established the ratio of 15.988 to 1, familiarly 16 to 1, although the market ratio was 15.625 to 1. The divergence was, however, too slight to affect materially the supply of silver, but in 1849 gold was discovered in California, resulting in a decreased value of gold as compared with silver. Moreover, a metallic surplus appeared in our own markets, and silver began to be exported. As all the silver in circulation was divisionary coin, it was feared that a dearth of small change would result. The exportation of silver had already seriously depleted the stock of half dollars, the largest silver coin in use, and had begun to threaten the quarter dollars when in 1853 Congress reduced the fineness of silver coins less than one dollar from 900 to 835 and made them tokens to be issued only on government account. In so doing it did not affect the status of the silver dollar, for which as before free coinage existed—an empty privilege, since the silver dollar had a higher bullion value than the gold dollar. From the establishment of the mint until 1850 the aggregate coinage of the United States was $196,000,000, and in this total gold and silver were about equally represented. In the next 10 years, 1851–60, no less than $403,000,000 were coined, of which less than $48,000,000 were silver. Such a change denotes not only that gold predominated in the metallic circulation of the period, but also that the metallic circulation itself became a thing of moment in the community.

The Civil War introduced new elements into our monetary circulation—paper money and the national bank note. Soon after the outbreak of hostilities specie payments were suspended. The government seemed to have exhausted every device of borrowing when it grasped the dangerous expedient of paper issues. Treasury notes bearing interest had several times in the history of the nation been resorted to, but it was not until the Act of Feb. 25, 1862, was passed that non-interest-bearing notes were issued. One hundred and fifty million dollars of notes were authorized and they were declared a legal tender for all debts, public and private, except duties upon imports and interest upon the public debt. Subsequent issues in July, 1862, and March, 1863, brought up the aggregate amount authorized to $450,000,000. This flood of paper money drove gold to a premium and swept away the silver subsidiary coinage. It became necessary to supply the place of the latter, and small notes called postage and later fractional currency were authorized in 1862 to the extent of $50,000,000. From the highest denominations down to three cents the monetary circulation of the nation was paper only, the issues of the United States government and the issues of the banks. In 1863 the national banking system was organized, but few banks availed themselves of the privilege of a national charter until after March 31, 1865, when a tax of 10 per cent on the circulation of State banks outstanding after Aug. 1, 1866, was enacted. This doomed the State bank notes, and banks which clung to the note-issuing privilege organized under the national law.

When peace had been declared the condition of the currency received attention. The volume of paper outstanding was reduced to $356,000,000 before 1868. In that year the fear of a monetary stringency due to contraction of the currency caused Congress to abandon this policy, and this postponed the day of redemption. In 1873 additional issues were made and the amount outstanding raised to $382,000,000, which limit was fixed as a maximum. In 1875 the Resumption Act was passed providing for a return to specie payments Jan. 1, 1879. Some slight progress towards a metallic basis had already been made by calling in the fractional

currency. The Resumption Act authorized the Secretary of the Treasury to sell bonds for the purpose of providing a gold supply sufficient to redeem the notes. It also removed the restriction which had previously rested on the volume of the national bank currency and provided that when additional bank notes were issued an amount of legal-tender notes equal to 80 per cent of such issues should be retired. The fear of contraction which had dictated a bill to repeal the entire Resumption Act, which failed only through the President's veto, succeeded in May, 1878, in abolishing this retirement provision, but not before the volume of notes had been reduced to $346,681,016, at which point the issue has remained. Much trepidation was felt lest resumption should not succeed and lest the applications for the redemption of notes should exhaust the reserve provided. But these fears proved groundless, and resumption was effected quietly and without difficulty. From 1879 the notes have been convertible into gold upon demand. No fixed reserve of gold for this purpose was prescribed by law, but the practice of the Treasury has been to keep on hand nominally at least $100,000,000 for this purpose. Whenever the reserve fell below this limit, grave concern was felt, and more than once resort was had to the issue of bonds to sustain the reserve. The Law of 1900 provides a reserve of $150,000,000 for the redemption of these notes, and provides more effective and more expeditious means for its replenishment.

Before 1862 the centre of interest and discussion in our monetary circulation lay in the notes of banks. It was then transferred to the paper issues of the government, and after 1876 to silver. During the Civil War period the United States began to produce silver as well as gold in considerable quantities, but as all our money was paper this did not affect the monetary circulation. In 1870 a revision of the coinage laws was undertaken with the purpose of codifying existing law. One of the features of the codification was the omission of the silver dollar from the list of coins. The measure was an executive one and there was considerable difficulty in securing for it the attention of Congress, which listened impatiently while its provisions were being explained. Between 1870 and 1873, when it became a law, it had been thoroughly discussed in Congress and should have been well understood. The omission of the silver dollar made the United States theoretically a gold-standard country. This law which effected the demonetization of silver was the famous "crime of 1873," concerning the passage of which the wildest statements were current at a later date. The simple fact is that at the time no one was aware of the significance of the demonetization of silver.

The agitation for the resumption of specie payment brought forward the contest between contractionists and inflationists. The latter failed in their efforts to balk the resumption policy, but the general feeling on which their argument rested, that a healthy currency must expand with the needs of the country, had to be reckoned with. This led in 1876 to the appointment of the Monetary Commission (q.v.), whose report presented in 1877 favored the free coinage of silver and thus began the long battle for that ideal. Germany had adopted the gold standard and was selling silver, the mines of the United States continued to increase their output, and silver was falling in the market below the legal ratios established by long usage in bimetallic countries. A bill for the free coinage of silver passed the House of Representatives in 1878. The Senate, however, was unwilling to accept for the United States alone the whole burden of the rehabilitation of silver, and a compromise resulted in the Bland-Allison Act, which was passed over the President's veto, Feb. 28, 1878. It provided that not less than $2,000,000 worth of silver nor more than $4,000,000 worth should be purchased monthly and coined into standard silver dollars (412½ grains of silver 900 fine), which should be a full legal tender for all debts, public and private, without exception. It also authorized the President to call an international conference for the adoption of international bimetallism at a common ratio to be agreed upon. It also permitted the issue of silver certificates in sums of $10 and upward for standard silver dollars deposited in the Treasury. No relief came from the international conference, and the coinage went on increasing in volume as the price of silver fell. Soon embarrassment was caused by the tendency of these dollars to return to the Treasury, as less than $60,000,000 were absorbed by the circulation. There was no difficulty, however, after a Law of 1886 permitted the issue of certificates in denominations of $1, $2, and $5. While the number of dollars in circulation is not large, there is no obstacle to the circulation of silver certificates.

Under the Law of 1878, which continued in force until 1890, $378,000,000 were coined. The price of silver continued to fall and with it the price of other commodities. International bimetallism as a remedy for falling prices continued to gain favor among economists, and the agitation for free silver coinage in the United States grew in strength. In 1890 again the House of Representatives passed a free-coinage bill, but a compromise worked out in the Senate was finally accepted and became law. This provided for the purchase of 4,500,000 ounces of silver monthly and the issue of Treasury notes for the cost price thereof. These notes were a legal tender, and the privilege was given to the Treasury Department to coin the silver thus purchased and replace the notes with silver certificates. The embarrassments of the Treasury and the difficulty of keeping the growing mass of silver money at a parity with gold led in 1893 to the repeal of the compulsory silver purchase provision. Under this law 168,000,000 ounces of silver had been purchased and Treasury notes to the amount of $155,000,000 issued. The repeal of the act in 1893 took place only after a severe struggle, and the friends of silver did not give up the fight. The presidential contest of 1896 was fought out on the free-coinage question and resulted in the signal defeat of the Silver party. In 1900 a new currency law was passed which squarely defined the gold dollar as the standard of value in the United States. It provided, as already stated, a larger reserve for the redemption of the legal-tender notes. The attempt to make silver dollars redeemable in gold was, however, unsuccessful. The same measure favored the expansion of the national bank note issues by permitting note issues to the amount of the par value of the bonds deposited and by reducing the tax upon the circulation of banks.

See articles BANK, BANKING; BIMETALLISM;

CURRENCY; FOREIGN MONEY; GRESHAM'S LAW; LATIN UNION; MONETARY COMMISSION; MONETARY CONFERENCES.

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MONEY ORDER. See POST OFFICE.

MON'EYWORT'. A popular name for various plants of the genus *Lysimachia* (q.v.).

MONFORTE DE LEMOS, mŏn-fôr'tā dā lā'mŏs. A town of northwest Spain, in the Province of Lugo, situated in a fertile valley, 35 miles south of Lugo, with which it has railroad connection (Map: Spain, B 1). Near by is a hill on which are the ruins of a castle of the lords of Lemos. The town has a secondary school installed in an attractive old Jesuit convent. The chief industry is cattle raising, and there are some manufactures of cloth, soap, and chocolate. Pop., 1900, 12,999; 1910, 13,838.

MONGE, mônzh, GASPARD (1746–1818). A French mathematician, born at Beaune. He was educated at Beaune and at Lyons and when only 16 years old obtained a position to teach physics and mathematics at the latter place. From there he went, in 1765, to the school of engineering at Mézières as designer. He was soon made assistant and in 1768 professor of mathematics in the military school itself. In 1780 he became a member of the Academy of Sciences at Paris, and in 1783 was appointed examiner of the naval pupils. In 1792 he was appointed Minister of Marine and the next year he took an active part in organizing the national defense. He was also active in the organization of public education, was one of the first professors in the Ecole Normale, and was one of the founders of the Ecole Polytechnique. He went with Bonaparte to Egypt in 1798, undertook the direction of the Egyptian Institute, and conducted the search for Egyptian antiquities. In 1805 he was appointed Senator, and in 1806 received the title of Comte de Péluse. After the Restoration he lost his offices and at this time he fell into a state of melancholy from which he never recovered. He is famous chiefly as the founder of descriptive geometry (see GEOMETRY), a science long kept as a government secret. But he made important contributions to other branches of mathematics as well. The development of modern geometry dates from him; he introduced into analytic geometry of three dimensions a thorough treatment of linear equations, completed the study of surfaces of the second degree which had been begun by Euler, and established the principles of the integration of partial differential equations in connection with the theory of surfaces. Following are his principal publications: *Traité élémentaire de statique* (1788; 8th ed., 1846); *Géométrie descriptive* (1795; 7th ed., 1847; new German ed. 1900); *Application de l'analyse à la géométrie des surfaces du premier et deuxième degré* (1795; 5th ed., 1850). Consult: Brisson, *Notice historique sur Monge* (Paris, 1818); Dupin, *Essai historique sur les services et les travaux scientifiques de Monge* (ib., 1819); Obenrauch, *Monge, der Begründer der darstellenden Geometrie als Wissenschaft* (Brünn, 1893–94).

MONGHYR, mon-gēr', or **MUNGHIR.** The capital of a district in Bengal, British India, on the south bank of the Ganges, 34 miles northwest of Bhagalpur (Map: India, F 4). The city proper, extending picturesquely for 6 miles along the river bank, is dominated by a fort containing the district offices and headquarters. During the eighteenth and nineteenth centuries Monghyr was noted for its manufactures of firearms, swords, and ironware, which are still in local demand. Cotton, cloth, shoes, furniture, and soap are manufactured, and there is a large trade in agricultural produce, especially butter. Pop., 1901, 35,880; 1911, 46,913.

MONGIBELLO, mŏn'jĕ-bĕl'lō. The Sicilian name for Etna (q.v.).

MÖNG NAI, mēng nī. An eastern state of the feudatory southern Shan States, British Burma (Map: Burma, C 2). Area, 2717 square miles. It has many mountains alternating with fertile valleys in which are raised rice, tobacco, sugar cane, and tropical fruits. There are manufactures of Shan paper. Pop., 1901, 44,252; 1911, 35,623. Capital, Möng Nai.

MON'GOL DYNASTIES (Mongol. probably from *mong*, brave). From the earliest times the tribes that became known as Mongols about the twelfth century dwelt in eastern Asia, in and about the modern Mongolia. They were organized and made a great conquering power by Genghis Khan (1162–1227). The great Asiatic Empire which was made his by conquest was divided among his sons, of whom Ogotai received

northern China and Mongolia and succeeded his father as Great Khan. Under Kublai Khan, the grandson of Genghis, who became Great Khan in 1259, the Empire was practically divided into four parts. The first, which was actually ruled by the Great Khan, included China, Korea, Mongolia, Manchuria, and Tibet, with its capital at Peking. (See CHINA; KUBLAI KHAN.) The second, the Middle Tatar Empire, given by Genghis to his son Tchagatai, included Sungaria, Transoxiana, Afghanistan, and a part of Chinese Turkestan. Its history differs in no way from that of other Asiatic states until, under a weak descendant of Tchagatai, the real power fell into the hands of the ruthless Tamerlane or Timur (q.v.), who made Samarkand the capital of his Empire. The third division of the Empire of Genghis Khan, the Empire of Kiptchak (q.v.), or the Golden Horde, was assigned to Batu, a grandson of Genghis by his eldest son Jujy. In 1237 a vast Mongol horde entered Russia (q.v.) and, after carrying destruction through that country with fire and sword and forcing the princes to do homage, pressed into Poland and Germany and on the field known as the Wahlstatt, near Liegnitz, in Silesia, defeated an army of Poles, Silesians, and Teutonic Knights in April, 1241, suffering such heavy losses, however, as to be compelled to retreat. In the same year another army under Batu Khan overwhelmed the Hungarians under their King, Béla IV. In 1242 Batu Khan was recalled to Asia by the news of the death of Ogotai. As long as the house of Batu continued the Kiptchak Mongols or Tatars held Russia in vassalage and kept eastern Europe in constant terror. They met their first defeat at the hands of the Russians in 1380; but their strength was most seriously undermined by the new Tatar invasion under Timur (q.v.) in 1389. The Empire dissolved into the separate khanates of Kazan, Astrakhan, and the Crimea. In 1480 the Russians emancipated themselves from the overlordship of the Mongols. The khans of the Crimea became vassals of the Turkish sultans in 1475. Kazan was taken into possession by Ivan the Terrible of Russia in 1552, and Astrakhan in 1554.

The fourth division included Persia, Georgia, Armenia, Khorasan, and part of Asia Minor. In 1253 Mangu, the fourth Great Khan, a grandson of Genghis, sent his brother Hulaku to govern this part of the Empire and to complete the conquest begun by Genghis. Hulaku crossed the Oxus, destroyed the sect of the Assassins (q.v.), took Bagdad, and put an end to the Abbaside caliphate (1258). He reduced Persia to complete subjection and added Mosul, Mesopotamia, Syria, and a large part of Asia Minor to the Mongol conquests. He became the founder of a dynasty known as the Ilkhans, which ruled over Persia till 1335. His religion was the pure theism of his house, and he was broadly tolerant towards both Christian and Moslem. His wife was a Christian. He established his capital at Maraghah in Azerbaijan, and there maintained a court where science and the arts were liberally cultivated. Hulaku assumed independent sovereignty upon the death of Mangu Khan. He died in 1265, and was succeeded by his son Abaka, whose ability and virtues excelled those of his father, and who had the advantage of being able to treat the country as an organizer rather than as a conqueror. The son of a Christian mother, he married a daughter of the Greek Emperor, Michael Palæologus, and is thought to have been himself a Christian. He was a devoted patron of learning. His reign was for the most part peaceful; but he expelled from his realms a Tatar army, defeating the invaders near Herat. He died in 1282. Abaka Khan was succeeded by his brother, baptized under the Christian name of Nicholas (Mongol Nikudân), who became a Mohammedan and persecuted the Christians and Mongols until he was warned to desist by his powerful uncle, Kublai Khan. When he apostatized he took the name of Ahmed. He was put to death in 1284 by Argun, the son of Abaka, who then ascended the throne. Argun followed the liberal and pro-Christian traditions of his father and grandfather. He opened diplomatic relations with Europe, whither he sent a Genoese, Buscarelli, as his agent. He proposed to make an alliance with the Pope, England, and France against the Mohammedan power. Marco Polo, the famous Venetian traveler, conducted a Mongol bride from the court of Kublai to Argun, but the latter died before their arrival, in 1291. A successor, Kai Katu, died in 1294, and the direct succession was restored by Ghazan Khan, the son of Argun. He waged a successful war with the Egyptian Sultan, and continued the friendly intercourse with Europe which his father had begun. In his later years he adopted Mohammedanism. He was a patron of literature, like his predecessors, and caused a history of the Mongols to be written by one of the scholars at his court. He made many improvements, especially in the administration of justice, and built roads and established post routes. He died in 1303. His brother and successor, Mohammed Kudah Bundah, made Es-Sultaniyeh his capital, attached himself to the Moslem sect of Ali, and died in 1316. The son of the last prince, Abu Said, was a mere child, and the common experience of absolute monarchies, a struggle for power between leading chiefs, followed his accession and introduced the seeds of weakness into the Mongol dominion. Juban, who was successful in this rivalry, married the young Khan's sister; but when Abu Said became of age he showed the spirit of his race and defeated and killed his aspiring vassal in 1327. His death in 1335 was the practical end of the Mongol monarchy in Persia. His successors until 1344 were mere puppets in the hands of ambitious chiefs, and anarchy made easy the conquests of Timur. Timur was likewise of Mongol origin and akin to the family of Genghis. The Mogul (or Mongol) dynasty in India (q.v.) was founded by one of his descendants, Baber, in 1526. Consult: Joseph Hammer-Purgstall, *Geschichte der goldenen Horde* (Budapest, 1840); id., *Geschichte der Ilchane* (Darmstadt, 1842); Yule, *Cathay and the Way Thither* (London, 1866); C. R. Markham, *History of Persia* (ib., 1874); H. H. Howorth, *History of the Mongols* (4 vols., ib., 1876–78).

MONGO'LIA. The land of the Mongols; a Chinese colonial possession, which stretches through Central Asia from Eastern Turkestan, Sungaria, and the Altai Mountains on the west to Manchuria on the east, and northward from China proper to the four Siberian provinces of Tomsk, Yeniseisk, Irkutsk, and Transbaikalia. The term is sometimes stretched to include Sungaria on the west, where many Mongols dwell, and Kokonor, which lies north of Tibet, but is separated from Mongolia proper by the Chinese

province of Kansu. The area is estimated at about 1,367,900 square miles.

Physical Features. Three physically distinct regions are recognizable: 1. A central elevated plateau known as the Desert of Gobi, 2500 to 3000 feet above the level of the sea, 500 miles or more in breadth, and extending from southwest to northeast for 1000 miles. It can hardly be described in general terms because of its diversified character. The area may be divided into a series of deserts having their own special characteristics. The Lop desert, with little break in its general level, the Kum-tagh, with a surface broken by undulations; the Hami, with a few mountain ranges; the Ordos, similar to the Lop; and Eastern Gobi, with great diversifications, are some of the areas. Extreme elevations reach in Eastern Gobi to 8000 feet; while in the Hami region a number of depressions exist, one reaching to 925 feet below sea level. Towards the west and southwest are parts overblown with loose sands, which fill the bottoms of the smaller valleys, or form fantastic, ever-changing ridges and hillocks, presenting a weird and dreary aspect, and traversable only by camels. Elsewhere, however, especially towards the Hurku Hills in the west, and in the northeastern section, are found many wide grassy plains with patches of scrub and furze and clumps of parched flowers, merging in the north into the rich pasture land and fairly wooded hill country south and east of the Kentei continuations of the Yablonoi Mountains of Siberia. 2. A still more elevated plateau from 3000 to 5000 feet above the level of the sea, lying to the northwest of this so-called desert plateau and bounded towards Sungaria and Siberia by the Altai and the Sayan Mountains. This is the region sometimes called Outer Mongolia. It is a mountainous country, clad with forests and intersected with numerous streams. The chief mountains are the Tannu, the Keutai, the Ektagh Altai, the Khangai, and the Chamur, with a general northwest to southeast trend. 3. The fertile, undulating, and well-wooded region usually called Eastern or Inner Mongolia, lying to the south and southeast of the Gobi, and intersected by the greater Khingan Mountains and their southwestern continuations. It lies along the Manchurian provinces of Kirin and Shingking, and stretches westward along the Great Wall as far as Kweihwaching (Kukuhoto). Large tracts of the Gobi desert in Inner Mongolia are being reclaimed by Chinese settlers through the simple process of irrigation.

Hydrography. With the exception of the southwest parts of the Gobi plateau, the country is fairly well watered, affording good pasturage, and even in those regions numerous rills are encountered, which, however, speedily lose themselves in the sand. Water, however, may be found almost everywhere by digging a few feet. Many lakes are scattered over most of the area; the largest, Kosogol, lies at an altitude of 5320 feet. These are drying up and from some of them thousands of tons of salt are obtained. On the extreme east, partly in Manchuria, is the Dalai-nor, and there are many lakes of less extent in southeast Mongolia. Unfortunately, these regions are so frequently wind-swept that the water holes are soon covered over or hidden by the fine dust with which the winds are laden. The drainage of the country is partly to the north, into Lake Baikal by the Eder, the Orkhon, and other tributaries of the Selengha, and partly to the northeast and east by the Onon, through the Shilka, and by the Kerulen, through the Dalai-nor and the Argun into the Amur. The extreme eastern part of Mongolia drains partly into the Amur through the Nonni and the Sungari of Manchuria, and partly to the sea by the Shira-muren, which finds its way into the Gulf of Pechili by the Liao. Many streams flow down the mountain slopes and are lost in the desert sands.

Geology and Minerals. The geology of Mongolia is only imperfectly known. The country seems to be built up of granites, gneisses, and crystalline schists of Archæan age, and there are indications of its being rich in minerals. In the Sayan Mountains immense beds and bowlders of nephrite have been found, and in the Kitoi Alps, near Lake Baikal, are great deposits of serpentine and graphite. Silver ores and graphite have also been found on the Mongolian side, and coal, apparently of Jurassic age, has been found in the Tannu Mountains and the Yenisei basin, as well as near Kukuhoto (Kweihwaching), near the great bend of the Yellow River. In the lower or central plateau red and brown conglomerates, sandstones, and clays are common, and both crystalline and mountain limestone abound in the Khingan Range.

Soil, Climate, and Vegetation. Except in the vicinity of the lakes and rivers, along the rich alluvial borderlands of the Khingan Range, and the loess deposits north of Shansi and Chihli, the soil is poor and little agriculture is possible. Authorities differ concerning the origin of the Gobi sands and they have been ascribed to lacustrine, marine, and aërial denudation. In southeast Mongolia, where the average summer temperature is 77° F., indigo, cotton, opium, and rice are produced, as well as the usual cereals, while in central Mongolia only small quantities of wheat, oats, buckwheat, and millet are grown. In the northwest agriculture is attempted only in the vicinity of the lakes and along the lower courses of the rivers. Winter lasts for from six to eight months, and in December the mercury falls in some places to 44° F. below zero. The air is dry; during the winter the cold winds from the interior prevail, while during the summer the south and southeast winds bring some moisture. At Urga, the capital, in lat. 48° 20′ N., long. 107° 30′ E., 600 miles north-northwest of Kalgan, the annual rainfall is only 9½ inches, and the mean summer temperature 64° F., and at Uliassutai, in the northwest, 5400 feet above sea level, the July temperature is 66° F. The snowfall is never great, but the icy sandstorms and snowstorms of the spring are disagreeable.

Fauna. The fauna resembles that of Siberia, in the north where the Siberian types penetrate up the valleys of the Selenga basin, and is not extensive. It is richest in fur-bearing animals, as hares, foxes, sables, and squirrels, and there are deer, marmots, black bears, kiang or mountain goats, ounces, and wolves. The wolves never run in packs, seldom attack men, and are far from brave. Droves of wild camels, ponies, asses, and mules are found, and their young are sometimes captured. Among game birds is the partridge. Except in the settled regions near China, cats and chickens are seldom seen. No encampment is complete, however, without a pack of barking, currish dogs. The camel is two-humped, but does not possess the water cells of the camels of the Arabian desert.

Industries. Mongolia has practically no manufactures. The chief industries are the rearing of flocks and herds and the breeding of horses. In the northwest, and to a less extent elsewhere, hunting is engaged in, and furs, skins, deers' horns, etc., form important articles of trade. Felt and certain kinds of woolen goods are produced, and two kinds of silk are woven in the rich agricultural districts occupied by the Chinese and the sedentary Mongols (i.e., the region between the desert and the Great Wall), whose trade is with north China. Trade centres chiefly in Urga, Kobdo, Uliassutai, and Maimaichin, opposite the Russian town of Kiakhta (840 miles north-northwest of Kalgan, q.v., also an important trade centre), and Kukuhoto or Kweihwaching, a walled Chinese town near the great bend of the Yellow River and an important point of departure for the trade with East Turkestan and Ili. Other cities are Jehol (q.v.); Lamamiao, 150 miles northeast of Peking; Pa-K'ow, 60 miles east by south of Jehol; Chi-fung-hien, 150 miles northeast of Jehol; and Hada, situated in lat. 42° 10′ N. and long 119° E. Trade is carried on mostly by barter, furs, woolen stuffs, skins, sheep, camels, horses, etc., being exchanged for salt, timber, tea, silk, cottons, sugar candy, etc. Brick tea is the chief medium of exchange. No regular currency exists in Mongolia. Chinese lump silver is in use everywhere and Chinese coins where the Chinese are found, while Russian coins and notes are accepted in outer Mongolia.

Chinese imports into Mongolia are mainly cotton sheetings and piece goods, mostly of British origin, and silks, brick tea, all sorts of metal utensils, religious articles, flour, paper, tobacco, combs, and boots. Goods from Russia include felt and cotton manufactured goods for clothing, metal and enamel ware, dressed skins, sugar, groceries, iron, tobacco, spirits, and wines. As the Mongolian has very simple tastes he is easily satisfied with inferior goods and his demands are few. The Urga government imposed a tax of 5 per cent ad valorem on imports by Chinese and 10 per cent on Chinese tobacco, wines, etc., while Russian goods are admitted free. Owing to the disturbed conditions there has been little trade recently between China and the Khalkha territory.

A very extensive and important transit trade, interrupted more or less at present, passes through Mongolia from Peking, through Kalgan and Urga to Kiakhta in Siberia, tea being the chief commodity from China. This gives considerable employment to several of the tribes as conductors of the caravans, particularly the Sunids, who occupy the central portion of the Gobi, and thousands of camels are employed. Roads—i.e., well-beaten tracks—abound, and run in all directions, except in the sandy parts, and there are usually two or more to every important place, camels going one way and ox carts another, depending on the pasturage and the water. There are few cities or towns, the Mongols being for the most part tent dwellers who usually camp on one spot all winter, but move occasionally during summer to some suitable pasturage within their own tribal limits.

Population. The population of Mongolia has been estimated at from 2,000,000 to 5,000,000. The latter number seems excessive, but it probably includes the inhabitants of Sungaria and Kokonor, as well as the very large number of Chinese who have taken up their abode here as merchants and farmers. Officially Mongolia is credited with 2,580,000 inhabitants, which makes about 2 to the square mile. Little estimates the number as low as 2,000,000, or about 1½ to the square mile.

Government. Originally the Mongolians were nomads, but at the present day they are such only in a partial sense, as each tribe now resides in a certain locality, and families change abode only twice a year, in summer and winter, and usually return to the same places.

Over each hoshun, or fief (Chin., banner), is a hereditary prince known as the jassak, whose power over his people is practically unlimited. An aimak is a group of one or more of these hoshuns, or fiefs, under the control of the senior prince of any related princely families. The Chinese call the aimak a *pu*, which means, loosely, a tribe. The league (Chin. *meng*) is a creation of the Manchu emperors to break up the Mongol tribal organization. In Khalkha the leagues are equal to the existing aimaks; in inner Mongolia the 24 aimaks form six leagues.

In 1911 the administrative divisions of Mongolia were composed as follows:

Inner Mongolia.
- The six leagues of inner Mongols.
- The Chahars.
- The Kukuhoto Tumets (Kuihuacheng Tumets).
- The Alashan Mongols (Eleuts).
- The Etsingol Old Torguts (Eleuts).

Outer Mongolia.
- The four leagues of Khalkhas.
- The Kobdo district.
- The Altai district.
- The Tannu-Urianhai lands.

The following Mongols live outside of what is generally known as Mongolia: 1. Twenty-nine hoshuns of Kokonor Mongols in the newly formed (in 1911) Chinese administrative division of Chinghai. 2. Various tribes of Mongol origin in Barga or Kulunber (the Hailar district in the northernmost Manchurian Province of Heilungkiang). 3. Mongol leagues of Unen-Sutzuktu and Batu-Setkhiltu in the Province of Sinkiang. These are Old Torguts and Hoshuts, both Eleuts. They number 13 hoshuns. 4. Some Chahars in Sinkiang, north of Ili.

The office of darga, or daruga (Chin. *meng chang*), means practically the president of a league. This office is filled by one of the jassaks and is elective. The entire number of jassaks meet periodically in a sort of diet, to settle any outstanding questions of civil, political, or economic nature which concern the league.

The jassak inherits his office as head of the hoshun, and was formerly confirmed by the Chinese Emperor. Most of the jassaks claim descent from Temu-jin (Genghis Khan) or his family. There are seven orders of nobility among these jassaks, and each prince of the inner Mongolian hoshuns had to appear once in three years at Peking for the New Year court celebrations. Theoretically the power of the jassak is unlimited over their serfs, but practically, owing to the unsatisfactory results of the system of primogeniture, they have little to do with the affairs of administration. Therefore they have the following assistants: a tusalakchi taiji (Chin. *hsieh li taiji*), a civil assistant, who administers the hoshun during

the jassak's absence, death, or minority, or until a new prince is confirmed. Generally there are two of these officials—a tzahirakchi or military assistant (Chin. *kuan chi chang ching*), who is a nontaiji chosen for his knowledge and ability; other officials for tax collecting, police duties, catching criminals, and the ordinary routine work. In the jassak's yamen all business and civil and criminal cases are decided, and records of affairs and expenditures are kept. Each jassak's hoshun is divided into a varying number of somons or sumuns, supposed to supply nominally 150 cavalrymen. Each somon is under an official called the tzangin, or tso ling.

The Mongols are very fond of titles, and in addition to the hoshun jassaks there are the taiji, of whom there are four classes, who are hereditary nobles who had not received any Manchu titles. Then there are some "sealless" princes, those who are Mongolian princes with Manchu titles but have no hoshun to administer.

Owing to the situation created by the *coup d'état* of Dec. 1, 1911, outer Mongolia is an autonomous state governed by a "sovereign" called the jebtsun dampa hutukhta (venerable sacred saint). The seat of his government is at Urga. He is assisted by a cabinet composed of the Premier and the Ministers of the Interior, Finance, Justice, War, and Foreign Affairs. The rest of Mongolia is governed from Peking by the Bureau of Mongolian and Tibetan Affairs (formerly the *Li Fan Yuen*, or Colonial Department), which sends resident officials, or ambans, as administrators to various Mongolian points.

Religion. Buddhism was introduced by Kublai Khan, and the Mongols are now strongly devoted to Lamaism (q.v.). Several males of each family become lamas or priests, and in this they are encouraged by the Chinese government. However, so many of the Mongols have entered the priestly ranks that the vitality of the race has been seriously diminished and it is even in danger of dying out. There are numerous great lamaseries in Mongolia—e.g., in the vicinity of Jehol (q.v.)—and temples are found well scattered over the country. The spiritual head of Mongolian Buddhism is the Kutukhta, or Living Buddha—next in importance to the Grand Lama of Tibet—who resides at Urga.

Social Life. The Mongols are a cheerful, good-natured, and hospitable people. They live in tents (*yurts*) of a very close-grained dark fabric, lined with felt, with a hole in the roof for escaping smoke, its occupants squatting on the felt-covered floor, supporting their backs against the boxes and chests which line the "wall." There is no furniture beyond small tables. Though Buddhists, they are not averse to flesh eating; but few except princes and nobles, or specially wealthy persons, can afford such a luxury. Their ordinary food consists of preparations of milk and millet, buckwheat flour, oatmeal, and the like. Mutton, however, is kept in the houses of the well-to-do for festive occasions, for the entertainment of guests, or to be used when prescribed medically. Except among princes and the agricultural Mongols bordering on China, chopsticks are not used—the fingers or a spoon suffice. Women are not secluded as in China, and in their marriage customs a semblance of the primitive fashion of wiving by "capture" is retained.

Language. Mongolian is an agglutinative language, belonging to the Ural-Altaic family. It is closely allied to the Manchu, and in its grammatical procedures it greatly resembles Korean. Throughout Mongolia proper it is free from dialectal differences, but slight differences exist in Kalmuck (as in Sungaria) and among the Buriatic Mongols of Siberia. It was reduced to writing in the time of Genghis Khan, the alphabet then introduced being borrowed from that of the Uighur Turks of Kashgar, who had at an earlier period borrowed theirs from the old Syriac, which had been introduced by the Nestorian missionaries. It consists of seventeen consonants, seven vowels, and five diphthongs. These are grouped on the left of a vertical stem, forming syllables which are arranged in columns read downward and from left to right. As in Korean, case is indicated by appended particles; the plural is formed by separable affixes; there is no grammatical gender; there are no relatives, and very few true conjunctions; the verb is very elaborate, the adjective uninflected; prepositions become postpositions; the governed word precedes that which governs it; and, as in China, the book language differs somewhat from the spoken. The literature is not extensive. It comprises Buddhist scriptures and some translations from the Chinese, some folklore and fairy tales, and the great history of the Eastern Mongols, written in the seventeenth century by Sanag Setsen. Both the Old and New Testaments were done into Mongolian by Stallybrass and Swan in 1836–46.

History. Little is known of the origin and early history of the Mongols. They belong to the Turko-Scythian branch of the Tatars, known in Chinese chronicles as the Hiung-nu, and are of the same stock as the Turks. Both branches of the Tatars, the Hiung-nu and the Tungusic, occupied that part of Asia now comprised in Mongolia, Manchuria, Sinkiang, and the bordering parts of Siberia and Turkestan. The Mongols are referred to in the history of the Tang dynasty (seventh century), but their early history is mythical and unreliable. In the ninth century they seem to be distinctly separated as a people from the rest of the Hiung-nu tribes. They emerge into world history with the appearance of Temu-jin, later known as Genghis Khan (q.v.). This leader united all of the nomadic Mongol tribes under his rule in 1206 A.D., and before his death in 1227 he had led his people in that great wave of bloodshed and conquest which overspread Asia and struck terror into Europe, building up an empire which included northern China, Turkestan, Mongolia, the Caucasus, and southern Russia. By 1263 the Mongols had conquered Syria, Mesopotamia, Tibet, and Indo-China. The next great figure in Mongolian history is Kublai Khan, who made Peking his capital in 1267, declared himself Emperor of China in 1280, and died in 1295. His dynasty, the Yuen, lasted in China until 1368. Driven out of China in that year by the founder of the Ming dynasty, the contemporary of Timur, the Mongolian Khalkhas retired to their former home north of the Gobi, still hoping for an opportunity to reconquer their lost territory, but a great leader did not arise. Mongolia was thus again separated from China and ruled by its own khans. Dayan Khan united all of the Mongolian territory under his rule in 1470, but when he died, in 1544, the country was divided among his 11

sons. The death of this prince is memorable, as it marks the breach between Khalkha and inner Mongolia, which hitherto had been united against the common enemy of both, the Eleuts. In 1616 the Manchus of Manchuria were united under Nurhachu, who declared war on China two years later. During this time the princes of inner Mongolia began to acknowledge the Manchurian leader as their own ruler. In 1644 the Manchus succeeded to the throne of China, with the help of certain Mongol tribes whose seats lay near the Manchurian frontier. In 1688 war broke out between the Eleuts of Sungaria and the Khalkhas, and the latter, being defeated in 1690, sought the aid and protection of China, after considering for a while whether Russian help would be more advisable. The whole of Khalkha now acknowledged the rule of China, and seven years later the operations of the Imperial armies, led in person by the Emperor Kang-hi, resulted in the utter defeat of the Eleuts and the death of their leader, Galdan. Sungaria became a Chinese possession, and all the tribes of Mongolia became vassals of the Emperor. In 1724 Kokonor was conquered by the Manchus, and the final subjugation of the Eleuts took place 30 years later. Valuable presents from time to time, the softening influence of Buddhism, the spread of Monachism, and the personal influence of the Dalai Lama of Tibet managed to preserve peace in Mongolia up to the Chinese revolution of 1911.

The opposition of the Mongols to the Chinese at the present day is due to the ever-increasing Chinese colonization of Mongolia and to the presence of Chinese military forces in that territory, which tend to destroy the autonomy of Mongolia as guaranteed by the Manchu emperors. More important, however, is the attitude of Russia. Russia desires to establish a buffer state between Siberia and China and thus prevent the flow of Chinese into her own sparsely settled territory. Her fear of the Chinese is largely economic. Neither does Russia wish to see Chinese soldiers in outer Mongolia, which would mean the proximity of a modern military force capable of threatening the Siberian Railway. In addition, there is a strong desire at present for a unity of all the Mongol races, and a legend has it that Amursana, one of the last of the Eleut princes to oppose the Manchus in 1754, will reappear and bring victory to the Mongols as in the days of Kublai Khan.

These phases of opposition to Chinese rule came to a head in 1911. The Chinese amban at Urga in that year put up barracks at Urga for the Chinese soldiers and also actively promoted Chinese immigration. These acts increased the ill-feeling between Mongol and Chinese. In July, 1911, a deputation of Mongolians went to Petrograd to solicit the assistance of the Russians in preserving Mongolian autonomy and, if possible, to establish Mongolian independence. Then the revolution in China broke out, and the Mongols took advantage of the chaotic conditions throughout the Empire to carry out a successful *coup d'état* at Urga, December, 1911. The Chinese amban, officials, and troops were forced to leave the Khalkhan district and return home, while the Mongolian hutukhta of Urga was proclaimed as ruler. January, 1912, the territory of Barga joined Khalkha in rebellion against China, for practically the same reasons, viz., fear of Chinese immigration and economic and military domination. Though the Chinese authorities of Barga peacefully withdrew, so as to give no cause for complaint, yet the territory set up a government dependent to Khalkha, and a bargut was installed at Hailar as amban, and to act as the viceroy of the hutukhta at Urga. Later the districts of Kobdo and Uliassutai also joined Khalkha in rebellion. President Yuan Shih-kai made efforts to conciliate the Mongols, but did not succeed in accomplishing much. Russia on her side encouraged the rebellious elements, and the fighting in 1913 resulted generally in favor of the Mongolian Russian-trained bands, aided by the Manchurian bandits and others.

There are three important agreements regarding the present unsettled state of Mongolian affairs. The Russo-Mongolian agreement of Nov. 3, 1912, comprises four articles, in which Russia engages to give aid towards Mongolian independence and to prevent Chinese troops or colonists from coming into Mongolia. Russian subjects and traders are given extensive privileges defined in an accompanying protocol. If Mongolia enters into any treaty with China or any other power, the present treaty cannot be altered or infringed without first obtaining the consent of Russia. In the protocol the Russians are granted the most complete freedom of trade, but no monopoly, and they may live, travel, and conduct business and manufactures in Mongolia. They may import and export all products and manufactures of Russia, Mongolia, and China duty free. Russian banks, post offices, and consulates may be established and land bought or leased. The use of rivers and roads for transport purposes is freely conceded. Disputes shall be submitted to arbitration, and a mixed tribunal shall be permanent wherever a Russian consulate is established.

In the agreement of Mongolia with Tibet, Jan. 11, 1913, the Dalai Lama, "Sovereign of Tibet," approves of the formation of an independent Mongolian state, and the "Sovereign of Mongolia" likewise approves of Tibet as an independent state. It is agreed that Buddhism is to be established on a firm footing, and mutual protection and assistance are promised by each of the new states to the other.

In the Russo-Chinese agreement of Nov. 5, 1913, China recognized the autonomy of outer Mongolia (Khalkha, the Kobdo district, and Urianghai), while Russia recognized Chinese suzerainty, and also that outer Mongolia is a part of China. The district of Barga, being in reality a part of the Manchurian Province of Heilungkiang, was not mentioned, for obvious reasons. China agreed not to send troops into outer Mongolia. Russia agreed likewise, with the exception of consular guards, and also agreed not to intervene in the administration nor to attempt colonization. China is to have representatives stationed at various places in the autonomous state.

An additional complication regarding Mongolian affairs arose in February, 1915. In the 21 demands made upon China by Japan in that year the Japanese government pressed for exclusive mining rights in eastern Mongolia, also that in the region named no railways shall be constructed without the consent of Japan, and that Japanese be given the right to settle, farm, trade, and purchase land.

The entire situation to-day is in a transitory

stage. There is a certain reaction of feeling against the Russians by the Mongols, who realize that they have not been successful in their hopes for a united Mongolia. Russia has succeeded for the time being in establishing an autonomous state in outer Mongolia, but it is certain that in the future China will attempt again to place all of Mongolia in the situation which existed during the Empire period.

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MONGOLIAN IDIOT. See MENTAL DEFECTIVES.

MONGOLIAN RACE. That division of mankind which is characteristically Asiatic and had its primitive home on the continent of Asia, whence it has sent out branches into Europe, Africa, the islands of the Pacific, and, in the opinion of some authorities, even to the continent of America. Brinton, who termed this the Asian race, included in it the Sinitic peoples (Chinese, Tibetans, Indo-Chinese) and the Sibiric peoples (Tungusic, Mongolic, Tataric, Finnic, Arctic, and Japanese-Korean groups), while he regarded the Malayo-Polynesian peoples as a branch descended from some ancestral tribe in Asia. Keane modifies this view and regards the Malay type as distinctly Mongolic, and also has an Oceanic Mongol group (including all the peoples of Malaysia and Polynesia who are not of Indonesian, Negritic, Australasian, Papuan, or Melanesian stocks), one of the divisions of his *Homo mongolicus*. Both these scholars reject the theory which would derive the American aborigines from a Mongolian stock. Some of the earlier ethnologists saw a large Mongolian (Turanian) element in western Asia and Europe, of which fragments were to be seen in Sumerians and Hittites, Pelasgians and Etruscans, Iberians and Basques, Picts, and other isolated peoples. Abundant evidence, however, is now forthcoming that Europe and western Asia have from prehistoric times been in the possession of peoples belonging to the Mediterranean branch of the white race and their more northern and southern congeners. The view of other authorities that the Celts are largely Mongolian lacks proof, as do also the views of those archæologists who explain certain industrial and social phenomena of later prehistoric Europe by invasions of Mongolian or Mongolized peoples from Asia. Outside of the Finno-Ugrian or Ural-Altaic peoples of northeastern Europe and the later Mongol and Turko-Tataric peoples of southeastern Russia, the Magyars of Hungary, the Turks of the Balkan Peninsula, and the Huns, Avars, and Bulgars, who came in the wake of the great migration of Germanic peoples (the last named still surviving to some extent in the Slavicized Bulgarians), the Mongolian population of Europe has probably never amounted to much at any epoch, the greatest invasions having taken place in historical times during the Middle Ages. Western Asia, Europe, and northern Africa have been as characteristically the environment of the white as the great mass of the Asiatic continent has been that of the yellow race.

The members of the Mongolian race possess, as a rule, straight, coarse hair (abundant on the head, less on the face, very scanty on the body), yellowish skin, a brachycephalous (or mesocephalous) head form, prominent cheek bones, a roundish face, a small nose, and small black

eyes, with slight elevation of outer angle and vertical fold of skin over the inner canthus. Their stature is medium or below the average. The "Mongolian spots" (q.v.) are also considered by some ethnologists a differentiating characteristic of this race. Certain bodily characteristics, as the relative proportion of trunk, limbs, and head of the typical Mongolian, have led many authorities to consider this the most childlike of all the human races. Color of skin, stature, and other peculiarities of a somatic nature account for the opinion of some that the Mongolian race is nearest to the original human stock, while the white, black, brown, and red races are held to represent greater divergences from the primitive type. That the Mongolian type should be the nearest to the original race and at the same time the closest to the child, who best represents the general human type, is very probable. Physically, then, the Mongolian race is of peculiar interest. Intellectually it runs a gamut equal to that of the white race, from the lowest tribes of Siberia, through the half-civilized peoples of Central Asia and the borders of China, to the great, ancient, and almost stagnant civilization of China, and beyond that to the rapidly advancing and progressive Japanese.

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MONGOLIAN SPOTS. A term applied by anatomical anthropologists to certain temporary pigment spots, bluish, gray, or blackish in color, found particularly in the sacrolumbar region and on the buttocks of newborn children, so frequently as to be regarded as a characteristic of the Mongolian races. These spots usually disappear between the ages of two and five, although they not infrequently last until the seventh year, and are occasionally found even in adults. Some anthropologists regard these spots as the most important distinctive race characteristic of the Mongolians. They have been reported from Chinese, Japanese, Koreans, Indo-Chinese, Malays and Polynesians, Malagasy, Ainu, Tungus, Kalmucks, Mongols, as well as among Eskimos, Mexican Indians, and even in full-blooded Europeans. It has been suggested that they may be rather a mark of the Indonesian than of the Mongolian race, but at all events, in view of the fact that they are by no means confined to the Mongolian race, and may possibly turn out to be quite common even in the white race, for the present their value as a real race characteristic is very doubtful. Consult Wardle, "Evanescent Congenital Pigmentation in the Sacro-Lumbar Region," in the *American Anthropologist*, vol. iv (New York, 1901).

MONGOLIAN SUBREGION. In zoögeography, a subdivision of the Palearctic region, which includes the table-lands of Central Asia, from the Caspian Sea to Japan. Its separation from other Asiatic faunal regions is mainly on ornithological grounds, and is neither distinct nor important.

MONGOOSE, mŏn′gōōs, or **MUNGOOS** (Telugu *mangīsu*). The mongoose (*Herpestes griseus*) is a species of ichneumon (q.v.), a native of India, but introduced into other countries, notably Jamaica, for the purpose of destroying rats and other vermin, upon which it feeds. In India it is often kept about the houses to reduce the number of lizards, mice, rats, and snakes. It kills and eats the most poisonous snakes, such as the cobra, the bite of which is either avoided by the animal's agility or else is not fatal to it.

The mongoose was introduced into Jamaica in 1872, when nine specimens were imported to destroy the rats on a sugar plantation. At first they were highly beneficial, reducing the stated annual loss from rats from $500,000 to one-half that, but in less than 20 years the island was almost overrun with them. Not only did they kill rats and mice, however, but snakes, lizards, ground birds, and even poultry. At one time snakes had become so rare that they were regarded as practically exterminated, but since 1896 they are apparently on the increase. The ground doves and other terrestrial birds, partly at least by change of habit, are also adapting themselves to this new enemy and their extermination is no longer to be feared. At the present time the mongoose is common and very tame in most parts of the island and in many other islands, and is generally looked on with favor.

The mongoose is from 15 to 18 inches long and has a tail 14 to 15 inches in length, very thick at the base and tapering to a point. The fur is rather long and grizzly reddish gray. A very full account of its habits is given in the *Royal Natural History*, edited by Richard Lydekker (London, 1893–96). For the details of its history in the West Indies, consult Morris, *The Mungoose on Sugar Estates in the West Indies* (London, 1882), and *The Field* (London, July 13, 1895).

MÖNG PAI, mĕng pä′ĕ. A state in the central division of the southern Shan States of British Burma. The land is generally hilly, particularly in the west and south. Rice is raised on irrigated land, and there are crops of tobacco, sugar cane, cotton, and fruit. Area, 660 square miles. Pop., 1901, 19,351; 1911, 20,287. Capital, Möng Pai.

MÖNG PAN, mĕng păn. An eastern state of the southern Shan States, British Burma (Map: Burma, C 2). The centre of the state is a level plain, surrounded by hills which rise to a maximum of 5000 feet. The north part is a dense jungle which produces teak. The main habitations are in the valley of the Nam Ton. Area, 2299 square miles. Pop., 1901, 16,629; 1911, 18,554.

MONIER-WILLIAMS, mō′nĭ-ẽr-wĭl′yŭmz,

SIR MONIER (1819–99). An English Sanskrit scholar, born at Bombay. He entered Oxford University in 1837, but soon obtained an Indian writership and studied at the East India College, Haileybury, where he gained the first prize in all the Oriental subjects. He resigned his Indian appointment, however, returned to Oxford, and graduated in 1844. He taught Oriental languages at Haileybury and at Cheltenham and in 1860 became Boden professor of Sanskrit at Oxford. His main work while at Oxford was the foundation of the Indian Institute, begun in 1875 and completed in 1896, of which he was curator till his death and to which he gave a valuable manuscript collection. Among his works are: *A Practical Grammar of the Sanskrit Language* (4th ed., 1877); *An English and Sanskrit Dictionary* (1851, 1888); *Practical Hindústání Grammar* (London, 1859; 2d ed., 1868); *Indian Epic Poetry* (1863); an edition of *Sakuntalā* (2d ed., 1876) and a translation of this drama (1853; 6th ed., 1890); *A Sanskrit and English Dictionary* (1872; 2d ed., with Lenmann, Cappellu, and others, 1899); *Indian Wisdom* (4th ed., 1893), an anthology of Sanskrit literature; *Modern India and the Indians* (4th ed., 1887); *Buddhism* (1889); *Brāhmanism and Hinduism* (1883; 4th ed., 1891).

MOÑINO Y REDONDO, mō-nyē'nō ē rā-dōn'dō, JOSÉ. See FLORIDA-BLANCA, COUNT OF.

MONIS, mō-nēs' (ANTOINE EMMANUEL) ERNEST (1846–). A French statesman, born at Chateauneuf-sur-Charente. A wine manufacturer by business, he made a particularly well-known brand of cognac. He was a deputy from 1885 to 1889. After becoming Senator in 1891 he was a prominent member of the Radical Socialist party. He held the portfolio of Justice in 1899–1902 in the Waldeck-Rousseau cabinet, and, after serving as Vice President of the Senate, became Premier in March, 1911, his party having contributed largely to the defeat of the second Briand ministry. He was seriously hurt (May 21) by an aëroplane which killed his Minister of War, Berteaux. The cabinet was forced to resign June 23, 1911, when the Chamber failed to vote confidence, and Monis was succeeded by Caillaux (q.v.). In December, 1913, he became Minister of Marine in the Doumergue cabinet, from which he resigned in March, 1914, after the *Figaro* had charged that in 1911 Caillaux induced Monis to postpone the trial of Henri Rochette (for fraud in promoting) until the charge was outlawed. The committee that investigated the Rochette affair censured the actions of Monis and Caillaux, but the Chamber refused to prosecute them.

MO'NISM (Gk. *μόνος, monos,* single). A philosophical term, in its broadest sense designating all systems of philosophy which define the sum total of reality as unitary, either in organization or in substance. It is thus opposed to dualism and pluralism (qq.v.).

In this broad sense, as indicating merely the final unity of all reality, monism represents the ideal of nearly every system of philosophy, and indeed by some thinkers it is considered to be the only legitimate philosophical ideal. In the history of philosophy the first conscious effort to attain a monistic system appears in the Eleatic teachings. (See ELEATIC SCHOOL.) Among the Ionians there had been philosophers who derived all phenomena from a single primal element, but the Eleatics were the earliest to assert the immutable unity of all that is real. They did not, however, definitely fix the nature of the unitary being. That nature might be of two sorts—material or spiritual. The ancient Atomists (see ATOMISM) advanced the doctrine of a material being, while Anaxagoras (q.v.) and Plato (q.v.), although in neither case attaining a pure monism, clearly pointed the way of modern idealism.

The first thoroughgoing monism, in a more exact and restricted sense, appears in the philosophy of Spinoza (q.v.), after scholastic controversies had crystallized the conception of substance and attribute. Spinoza taught that both material and ideal phenomena are attributes of one underlying substance which forms the monistic reality. His doctrine is thus analogous to the "mind-stuff" theory (q.v.), which teaches that matter and mind are diverse aspects of one reality, and is generally identified as the modern "scientific monism." But the great difference between Spinoza's monism and the doctrine of "mind stuff" is that for the former there is only one substance, all-inclusive; for the latter atoms of mind stuff are innumerable, being one only in kind, not in number. Materialism is also monistic; while idealism, denying the reality of matter, represents the opposing, complementary form of the doctrine. Idealistic monism is itself of two types, however. On the one hand there is that type which identifies the monistic reality with the will (Schopenhauerian voluntarism); on the other there is that type which finds the nature of reality in intellect. There is still a third type in which ultimate spiritual reality is regarded as having both intellectual and volitional character. Perhaps the most famous monism is the Hegelian, which expresses the unification in logical terminology, as the reconciliation of opposites in a higher synthesis.

The term "monism" is relatively recent, having been first used by Christian Wolf (1679–1754) to designate types of thought which endeavored to do away with the dualism of body and mind. For a considerable period it was used with explicit reference to relations involved in the epistemological problem (see KNOWLEDGE, THEORY OF), but in contemporary thought it has been extended to the senses indicated above. Consult: E. H. Haeckel, *Monism as Connecting Religion and Science* (New York, 1895); id., *Riddle of the Universe at the Close of the Nineteenth Century* (ib., 1900); G. J. Romanes, *Mind and Motion and Monism* (ib., 1895); W. L. Walker, *Christian Theism and Spiritual Monism* (ib., 1906); Arthington Worsley, *Concepts of Monism* (London, 1907); and bibliographies given under IDEALISM; MATERIALISM.

MO'NITA SECRE'TA SOCI'ETA'TIS JE'SU (Lat., secret instructions of the Society of Jesus). The title of a book purporting to contain private instructions for the members of the Society of Jesus, first published at Cracow in 1614 without any author's name. It was attributed by the enemies of the Jesuits to Claudio Acquaviva, the fifth general of the order; and, though it was condemned by the Congregation of the Index in 1616 as "falsely ascribed to the society, calumnious, and full of defamatory matter," it was for a long time received as authentic by these same enemies. Its genuineness has long ceased to be defended by scholars, whatever their point of view.

Recent investigations of the Cracow Academy have made it practically certain that it was written by the man whom the Bishop of Cracow names as its suspected author in the year following its publication—Jerome Zahorowski, a former Jesuit, who had been dismissed from the order for ill conduct in 1611 and took this means of revenging himself. Consult Huber, *Der Jesuitenorden* (Berlin, 1873), and Duhr, *Jesuiten-Fabeln* (Freiburg, 1891).

MONITEUR, mȯ'nē'tẽr', Le (Fr., the monitor). A French journal founded May 5, 1789, by C. J. Panckoucke under the title *Gazette Nationale, ou le Moniteur Universel.* Its great importance as a register of events begins with the crisis of Aug. 10, 1792. Its issues for the years 1789–99 were reprinted in 32 volumes by Gallois, *L'Ancien Moniteur* (Paris, 1840–45). In Nivôse of the year VIII (1800) the *Moniteur* began to publish officially the *Actes du gouvernement.* In 1811 it took as its sole title *Moniteur Universel.* From July, 1814, to February, 1815, the official part of the journal was suspended, the government issuing irregularly a *Journal Officiel.* After this the *Moniteur* was again recognized as the government organ and so continued until 1868, when the official part was separated from the *Moniteur* and took the title *Journal Officiel.*

MON'ITOR (Lat. *monitor,* one who warns, from *monere,* to warn; so called because the lizard was supposed to give warning of the presence of the crocodile). A large, semi-aquatic pleurodont lizard of the Old World, of the family Varanidæ, characterized by a long, deeply cleft, smooth tongue. The neck is relatively long and the skin is almost smooth; the tail is very long, often laterally compressed, forming a powerful swimming organ, and the teeth are large and pointed. There are nearly 30 species, all in the single genus *Varanus,* inhabiting Africa, southern Asia, and thence to Australia, but absent from Madagascar. Some species reach a length of 6 or 7 feet, and all are rapacious, seizing whatever animals they can master. Although most of them live in or around the water, others occur in dry inland regions or in the woods. The most familiar is the Nile monitor (*Varanus niloticus*), which inhabits all of Africa except the northwestern part. It is greenish gray, more or less mottled. This species spends most of its time in the water and is of service in keeping down the crocodiles, for whose eggs it searches and whose young it captures in the water. A well-known species of the East, found from northern India to the Philippines, is *Varanus salvator,* called in Ceylon kabaragoya. It is amphibious, but wanders widely in the forests and climbs trees with great agility. Consult: Tennent, *Natural History of Ceylon* (London, 1861); Mason and Theobald, *Burma: Its People and Productions* (ib., 1882); Hans Gadow, "Amphibia and Reptiles," in *Cambridge Natural History,* vol. viii (Cambridge, 1901). See Plate of Lizards.

MONITOR, The. One of the most famous vessels, and the first successful ironclad, in the history of the United States navy. It was built at Greenpoint, L. I., from designs by and under the direction of John Ericsson (q.v.), was launched on Jan. 30, 1862, and on March 6, 1862, under the command of Lieut. John L. Worden, started for Hampton Roads, Va., where it arrived on the night of March 8. During this day the Confederate ironclad vessel, the *Virginia* (commonly known as the *Merrimac,* its name prior to its capture at Norfolk by the Confederates), had destroyed or disabled a large part of the Federal fleet in the harbor. On Sunday, the 9th, the *Monitor* engaged the *Virginia* in a somewhat indecisive battle lasting several hours, the *Virginia* finally withdrawing up the Elizabeth River. While the action was not fully conclusive as regards determining the relative fighting capacities of the two ships, it was tactically and practically a complete victory for the *Monitor,* as she forced her opponent to retreat in a disabled condition and fully protected the ships of the Federal fleet from her attacks. Neither vessel was very seriously injured, and only a few men were wounded on either side, Lieutenant Worden, however, being seriously injured on the *Monitor.* On May 15, 1862, in company with the *Galena,* the *Naugatuck, Port Royal,* and *Aroostook,* the *Monitor* participated in an unsuccessful attempt to capture Richmond, and on Dec. 31, 1862, while en route to Beaufort, N. C., she foundered in stormy weather off Hatteras, four officers and 17 men being drowned. The engagement between the *Monitor* and the *Virginia* (or *Merrimac*) was one of the most important and significant in the naval history of the world, demonstrating as it did the value of armored vessels and large guns, while the events of the day before showed the impotence of wooden ships and guns of average (at that time) size against armor-clads. The successful issue of the *Monitor's* one naval action greatly relieved the minds of the people of the North, whose fears of the possible depredations of the *Merrimac* had almost become panic. Thereafter to them the *Monitor* type represented all that was efficient, powerful, and perfect in naval construction and it was a long time before a just estimate of her defects as well as her good qualities was admitted except by naval officers. Consult: Bennett, *The Monitor and the Navy under Steam* (Boston, 1900); Johnson and Buel (eds.), *Battles and Leaders of the Civil War,* vol. i (New York, 1887); Wilson, *Ironclads in Action* (London, 1896); Hill, *Twenty-six Historic Ships* (New York, 1903). See the article Ship, Armored.

MONITOR BUG. A local name in California for the bloodsucking cone-nose (*Conorhinus sanguisuga*). See Cone-Nose.

MONITO'RIAL SYSTEM OF MUTUAL INSTRUCTION. A term applied to a system of school organization and instruction popular during the first half of the nineteenth century in Great Britain and to a less degree in some continental countries and in America. The practice is to be found frequently in educational history, but in its specialized sense it was employed in 1795 by Dr. Andrew Bell, superintendent of the Orphan Asylum at Madras, who made use of the more advanced boys in the school to instruct the younger pupils. In 1797, after his return to England, Bell described the practice in a work which attracted little attention. At about the same period the idea seems to have occurred, according to his own account, quite independently to Joseph Lancaster (q.v.), who improved and popularized the method. The question of priority led to long and acrimonious disputes. Hence the system is often called the Bell or the Lancastrian system of instruction. The supporters of Lancaster established the British and Foreign School So-

ciety and those of Bell the National Society, both of which may be said to have laid in the extension of the monitorial schools the foundations of the English elementary school system.

The monitorial system was at once effectual and economical. By the employment of clever boys under the direction of the master, both for the purpose of keeping order and for giving instruction, the school might be made self-operative and several hundred boys taught with the employment of only one adult superintendent. The pedagogical idea upon which the system was based was that the school life of the child is divided into two periods: in the first the child should receive all the aid that the teacher can give him consistent with the development of self-helpfulness; in the second he should be taught to apply what he has acquired to the study of other branches and to the teaching of others, when he should be thrown as much as possible upon his own resources. The original organization of such schools was: (1) the master, who was the ultimate and absolute authority; (2) the usher, who was a sort of superintendent of management and discipline; (3) the subushers, who had charge of schoolroom materials; (4) the teachers, who had general oversight of two or three classes or groups; (5) the assistants, who had charge of each group or class; (6) the tutors, who assisted each child in the preparation of his lesson. In general, all these officials under the master were pupils, the pupils of one class becoming in turn the tutors of the one below. Lancaster's improvement upon the general scheme was the division of classes into small groups and the formulation of detailed methods of instruction in the elementary branches.

Consult: Lancaster, *Improvements in Education* (London, 1805); Bell, *Elements of Tuition* (ib., 1805); Meiklejohn, *An Old Educational Reformer* (ib., 1881); Gill, *Systems of Education* (Boston, 1889); Sharpless, *English Education* (New York, 1892); David Salmon, *Joseph Lancaster, Biography* (London, 1904), containing a bibliography. See LANCASTER.

MONIUSZKO, mō-nyush'kō, STANISLAW (1820–72). A Polish composer, born in Ubiel, Government of Minsk, Russia. He perfected his musical education under Rungenhagen of Berlin, in which city he also taught for a livelihood, but subsequently settled in Vilna. He was a prolific composer. He became director of the Warsaw Opera and held a faculty position at the Warsaw Conservatory. His works include numerous songs, church music, chamber music, orchestral and instrumental pieces, and 15 national Polish operas.

MONK. See MONASTICISM.

MONK, FREDERICK DE BARTZCH (1856–1914). A Canadian lawyer and statesman, born at Montreal and educated at McGill University. He was called to the bar in 1878, became prominent in the practice of his profession in Montreal, and was elected a Conservative member of the House of Commons in 1896 and leader of the Conservative party in Quebec Province in 1900. In the House of Commons he became known as a forceful speaker both in English and in French. When the Laurier administration brought forward its naval policy for the assistance of Britain, Monk vigorously opposed it unless it was to be ratified by further and direct reference to popular vote. He also opposed the reciprocity proposals made by Sir Wilfrid Laurier and embodied in the Taft-Fielding agreement of 1911. On the defeat of the Liberals and the accession of the Conservative leader, Robert Laird Borden (q.v.), to power, Monk was appointed Minister of Public Works. He resigned in 1912.

MONK, or **MONCK**, GEORGE, first DUKE OF ALBEMARLE (1608–70). An English general who directed the national demand for the Stuart Restoration. He was born at Potheridge, Devonshire, Dec. 6, 1608. Coming under the ban of the law for thrashing a civil officer who illegally attempted to arrest his father, he volunteered for service in Spain, where he distinguished himself on secret service. In 1629 he entered the Dutch army and acquitted himself gallantly at Breda. In 1639, at the outbreak of the Scottish troubles, he was appointed lieutenant colonel and won additional renown by saving the English guns in the rout at Newburn. In 1642–43 he commanded a regiment against the Irish rebels, gained several victories, and was appointed Governor of Dublin. In the early part of the Civil War he fought as a volunteer for the King, and in the Royalist defeat at Nantwich was taken prisoner by Fairfax. Charged with high treason, he was committed to the Tower, where he remained for two years. He regained his freedom by consenting to serve in Ireland. His conduct commended itself to Cromwell, who made him lieutenant general and chief of artillery. Parliament appointed him Governor of Carrickfergus and gave him a gratuity of £500. In 1650 Cromwell took him to Scotland, and, on account of his brilliant conduct at Dunbar, left him as commander in chief to complete the subjection of that country. In 1653 he became conspicuous in a new capacity as a sea fighter and, associated with Blake and Deane, won two great naval battles over the Dutch Admiral Tromp. He took part in the commission to arrange the union of Scotland and England, and went to the former country as Governor in 1654, with much difficulty maintaining his rule against the Presbyterians. Charles II tried to secure his support, but Monk sent the letter to Cromwell. After the Protector's death Monk declared in favor of Richard Cromwell and assumed the defense of public order when Lambert's insurrection threatened a military despotism. On Jan. 1, 1660, Monk crossed the border with 6000 men, joined Fairfax at York, and entered London, February 3, without opposition. His intentions were not known until February 28, when, owing to the unsettled condition of affairs and knowing of the national wish to bring back the Stuarts, he called together the Presbyterian members expelled from Parliament in 1648 and created a majority for the King. Charles II was formally declared King on May 8. He made Monk Duke of Albemarle, Privy Councilor, Chamberlain, and Lord Lieutenant of Devon and Middlesex. In 1665, as Governor of London during the plague, Monk remained at his post when every one else had fled who could. The King then employed him against the Dutch at sea. In June, 1666, De Ruyter with an overwhelming force defeated him in a three days' battle off Dunkirk. In the month following Albemarle gained a complete and sanguinary victory over De Ruyter off the North Foreland. During the last years of his life Monk lived in a measure retired from political and social life. He died at Newhall, Essex, Jan. 3, 1670.

Bibliography. Gumble, *Life of General Monck* (London, 1671), of special importance since the author was chaplain to Monk in 1659–60 and had special opportunities for obtaining information; Thomas Skinner, *The Life of General Monk* (ib., 1724); *Thurloe State Papers* (ib., 1742); *Clarendon State Papers* (Oxford, 1786); Clarendon, *Life* (ib., 1827); F. P. G. Guizot, *Monck, or the Fall of the Republic and the Restoration of the Monarchy*, translated by Scoble (London, 1851); *Calendar of Domestic State Papers, 1649–60* (ib., 1875–86); Clarendon, *History of the Rebellion* (Oxford, 1888); Julian Corbett, *Monk* (New York, 1889), in "English Men of Action Series"; Samuel Pepys, *Diary* (London, 1893–96); C. H. Firth, *Scotland and the Commonwealth, 1751–53* (Edinburgh, 1895); S. R. Gardiner, *History of the Great Civil War* (New York, 1897); Firth, *Scotland and the Protectorate, 1654–59* (Edinburgh, 1899).

MONK, MARIA (c.1817–50). A Canadian impostor. In 1835 she claimed to have escaped from the nunnery of the Hôtel Dieu in Montreal, and told of many revolting practices alleged to have been carried on within the walls. She came to New York, and so impressed many people of standing that they continued to believe her after she was proved to be of bad character and her story to be a clumsy invention. Her tale was printed in *Awful Disclosures by Maria Monk* (1836) and *Further Disclosures* (1836). More than 200,000 copies were sold and a violent anti-Catholic agitation resulted. William L. Stone, of the New York *Commercial Advertiser*, visited Montreal and exposed her in *Maria Monk and the Nunnery of the Hôtel Dieu* (1836). For this he was abused by the Know-Nothings, who made much capital of the story.

MONK BAT. A bulldog or mastiff bat (q.v.).

MONK BIRD. The friar bird (q.v.).

MONKEY (with double diminutive ending *k-ey*, from OF. *monne*, from It. *monna*, OIt. *mona*, she-monkey, old woman, contraction of *madonna*, lady, from *mia donna*, my lady, from *mia*, from Lat. *meus*, mine, and *donna*, from Lat. *domina*, lady; apparently so called from the resemblance of a monkey's face to that of an old crone). A popular name for a large number of mammals of the order Primates. In the broadest sense a monkey is any primate except a man or a lemur. Many of these, however, are better known under more particular names, as the marmosets, apes, gibbons, etc., and it will be proper here to consider monkey as including only the members of the two families Cebidæ and Cercopithecidæ (or better, Lasiopygidæ), further excepting baboons and macaques (qq.v.), which have short tails, limbs nearly equal and not specially adapted to an arboreal life, and the muzzle projecting so that the face is more or less doglike. We may, therefore, regard the monkeys in a strict sense as including all of the Cebidæ and, of the Lasiopygidæ, all except six genera, including the baboons, geladas, black apes, macaques, and their nearest allies.

New World Monkeys. The Cebidæ are exclusively American and include not less than 9 genera and about 85 species. They are readily distinguished from the monkeys of the Old World by the presence of 36 teeth, the absence of a bony external auditory meatus, the absence of ischiatic callosities, and the presence of a broad internarial septum. On account of the latter characteristic they were at one time grouped as a suborder, the Platyrrhini, while the Old World monkeys, since they have a narrow septum, were called Catarrhini; but these terms have now largely passed out of use. The principal kinds of American monkeys are the howlers, sakis, ouakaris, titis, squirrel monkeys, spider monkeys, barrigudos, and sapajous, or capuchins. The howlers (genus *Mycetes*, or *Alouatta*) are remarkable for the extraordinary cries which they are capable of emitting, owing to the enormous enlargement of the hollow hyoid bone and vocal apparatus. The face is supplied with a long beard, the tail is long and very prehensile, and the color is very variable, though usually dark. In intelligence the howlers are ranked among the lowest of the American monkeys, although in size among the largest. The sakis are long-tailed monkeys of the genus *Pithecia*, having a well-developed thumb and the lower incisors inclined forward; they also have the rami of the mandible expanded, though not so much so as in the howlers. A number of species are known, all South American, but varying greatly in the character of the hairy coat, the beard, and the bushiness of the tail; all are arboreal, have powerful voices, and make interesting pets, some species showing great attachment to their masters. The ouakaris differ from all the other American monkeys in having a short baboon-like tail, in spite of which they are exclusively arboreal. They are limited in their range and die soon after being sent away from their own home. There are three species, of the genus *Uacaria*, or *Cacajao*. The titis are small Brazilian monkeys with vertical lower incisors and a long nonprehensile tail, distinguished from the squirrel monkeys (*Chrysothrix*) by the small canine teeth and the bushy tail. These are both grouped by some authors in the genus *Saimiri*. About seven species of squirrel monkeys are known from northern South America; they have very large eyes and disproportionately long hind limbs and tail. The spider monkeys, comprising the genus *Ateles* and the aberrant woolly monkeys (*Brachyteleus*), are the most celebrated of the Cebidæ. *Ateles*, of which a dozen or more species are known, lacks a thumb and the coat is not woolly, while the members of the latter genus have a rudimentary thumb and a woolly coat. All these monkeys have the form slender, the limbs very long, and the tail extremely prehensile and naked beneath at the tip. Although so perfectly adapted to an arboreal life, they are not specially active, and the power of grasping by the hand is very imperfect, owing to the lack of a thumb. They range from southern Mexico and Central America southward to southeastern Brazil. The six species of barrigudos or true woolly monkeys (*Lagothrix*) are similar to the spider monkeys, but have a thumb and are much heavier. They rank with the howlers as the largest American monkeys. The sapajous are somewhat smaller and stouter than the spider monkeys and are the favorite species in captivity, which they bear very well. They have a thumb, and the undersurface of the tail is hairy; more than 20 species have been described, all of the genus *Cebus*.

These monkeys are all active animals, chiefly diurnal, though a few of the smaller forms are nocturnal. They live almost wholly in trees and feed upon fruits and insects chiefly, though eggs, young birds, and even some reptiles may vary the diet. They are themselves constantly

AMERICAN MONKEYS

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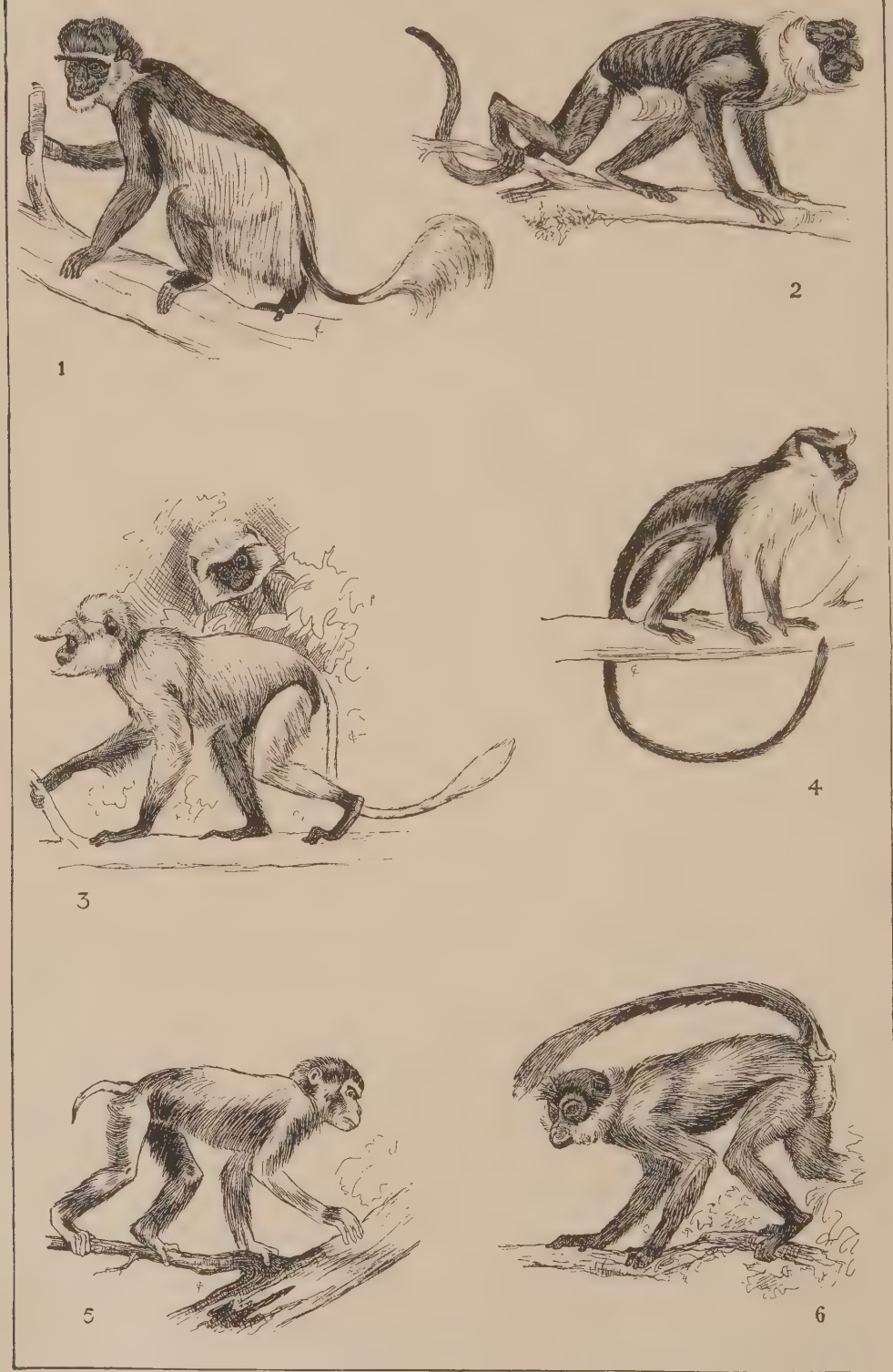
1. PINCHE MARMOSET (Œdipomidas œdipus).
2. BLACK SPIDER MONKEY (Ateleus paniscus).
3. BALD UAKARI (Cacajao calvus).
4. WEEPER SAPAJOU (Cebus capucinus).
5. BLACK HOWLER (Alouatta caraya).
6. WHITE-HEADED SAKI (Pithecia pithecia).

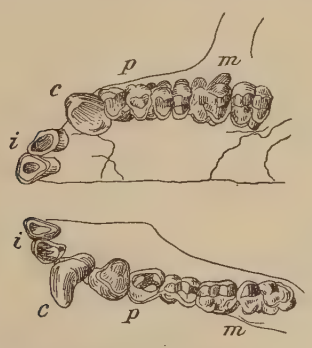
MONKEYS OF THE OLD WORLD



1. GUEREZA (Colobus abyssinicus).
2. PROBOSCIS MONKEY (Nasalis larvatus).
3. HANUMAN or SACRED MONKEY (Pygathrix entellus).
4. DIANA MONKEY (Lasiopyga diana).
5. PIG-TAILED MONKEY (Pithecus nemestrinus).
6. SOOTY MANGABEY (Cercocebus aethiops).

hunted by the Indians, who use them for food, and also use or sell the skins. The flesh of monkeys is said to be good eating, and some travelers speak in the highest terms of the meat of some of the spider monkeys. The Cebidæ are not only inferior to the Old World monkeys in size, but in intelligence do not compare with them. The sapajous are perhaps the most intelligent of the American species and in captivity make very interesting pets. Most of the monkeys seen in the United States with organ grinders are of this kind. The South American Indians shoot them with arrows, the tips of which are slightly poisoned with curare, and when the animal thus wounded has been captured, it is fed with salt, which is an antidote to the poison. The habits of monkeys are so well known that the verb "to monkey" has passed into current use as an unmistakable expression for meddlesome activity.

Old World Monkeys. Turning now to the Old World monkeys, which have 32 teeth, an external, bony auditory meatus, ischiatic callosities, and a narrow internarial septum, and leaving out of account the baboons and macaques, we face an assemblage of 10 genera and something like 185 species. Six of the genera are confined to Africa and four to Asia and the East Indies. *Cercocebus* is an African genus of four species, with teeth like a macaque, but with a long tail. *Cercopithecus*, or *Lasiopyga*, is a large African genus of over 70 species, of rather slender, long-tailed monkeys, including some of the best-known species. They are often called guenons. The thumb is of large size, both hands and feet are adapted for running as well as climbing, and the stomach is simple and not sacculated. They live in troops and make pillaging expeditions into cultivated grounds under the leadership of an old male. Of the various species of this genus which are in the market as pets, the mangabeys (q.v.) are favorites; they are usually blackish, with more or less white. The best known of African monkeys



DENTITION OF A MONKEY.

Upper and lower series of teeth, left side, of the green monkey: *i*, incisors; *c*, canines; *p*, premolars; *m*, molars. (Cf. LANGUR.)

is the common green monkey (*Cercopithecus*, or *Lasiopyga, callitrichus*), which is of medium size and olive green in color. It is widely distributed in Africa and over 200 years ago was introduced into St. Kitts, Grenada, and some others of the Lesser Antilles, where it has been quite destructive to crops. In identifying the various less-known species of *Cercopithecus*, or *Lasiopyga*, one of the most important points is the color of the nose. *Nasalis* is a notable genus containing a single species, the proboscis monkey (q.v.) of Borneo, in which the nose is greatly prolonged into a real proboscis. This species bears captivity poorly, and few living specimens have been seen in Europe or America. *Semnopithecus*, or *Pygathrix*, includes over 50 Asiatic species, such as the well-known hanuman and the langurs (qq.v.). The last genus, *Colobus* (see GUEREZA; KING MONKEY), includes about 30 African monkeys with the thumb rudimentary or wanting. Many of them are handsomely decorated with long, silky hair, and the pelts have considerable commercial value, being used for the manufacture of women's boas, muffs, etc. The Old World monkeys do not differ essentially from the Cebidæ, but they are not so exclusively arboreal and the tail is not prehensile. In many species cheek pouches are present, in which food may be stored, and such forms have the stomach simple; but in those forms where there are no cheek pouches the stomach is sacculated in an extraordinary manner. The latter monkeys are exclusively herbivorous and live largely on shoots and leaves. Monkeys breed usually but once a year and produce only one or two young ones at a birth.

The fossil remains of monkeys have been found in the Pleistocene deposits of Brazil and as far back as the Middle Miocene of Europe.

Bibliography. Consult standard natural histories, especially the books of Jerdon, Blanford, Blyth, and Wallace on India and the East; and of Azara, Humboldt, Bates, Wallace, Tschudi, Waterton, Belt, Gosse, and Alston on South and Central America; also R. L. Garner, *The Speech of Monkeys* (New York, 1892); H. O. Forbes, *A Handbook to the Primates*, in "Allen's Naturalists' Library," vol. ii (London, 1894); R. L. Garner, *Apes and Monkeys, their Life and Language* (Boston, 1900). A recent account is D. G. Elliot, *A Review of the Primates* (New York, 1913). See APE; MAMMALIA; PRIMATES; RHESUS; TITI MONKEY.

MONKEY BREAD. A tropical tree and its edible fruit. See ADANSONIA.

MONKEY FLOWER. See Colored Plate of CALIFORNIA SHRUBS.

MONK'FISH. See ANGEL FISH; ANGLER.

MONK'HOUSE, WILLIAM COSMO (1840–1901). An English art critic and poet, born in London. He was educated at St. Paul's School. In 1857 he became a clerk in the Board of Trade and in 1893 Assistant Secretary of Finance. His verse comprises: *A Dream of Idleness and Other Poems* (1865); *Corn and Poppies* (1890); *The Christ upon the Hill* (1895). Among his publications on art are: *The Italian Pre-Raphaelites* (1887); *The Earlier English Water-Colour Painters* (1890); *In the National Gallery* (1895); *British Contemporary Artists* (1899). He also wrote *Lives* of Turner (1879) and Leigh Hunt (1893) and contributed many articles to the *Dictionary of National Biography*.

MONK SEAL. The West Indian seal (*Monachus*). See SEAL.

MONKS'HOOD. See ACONITE.

MONKS OF SAINT BASIL. See BASILIAN MONKS.

MONK'S TALE, THE. One of Chaucer's Canterbury Tales, a miniature reproduction of Boccaccio's *Falls of Illustrious Men*.

MONKSWELL, mŭnks'wĕl, ROBERT PORRETT COLLIER, first BARON (1817–86). An English judge. He was born at Plymouth and was edu-

cated at Trinity College, Cambridge. Admitted to the bar at the Inner Temple in 1843, he established his reputation as a lawyer by his brilliant defense of the Brazilian pirates in 1845. He was elected a Liberal member of Parliament for Plymouth in 1852. While counsel to the Admiralty and Judge Advocate to the fleet he gave an opinion that would have prevented the Confederate vessel *Alabama* from going to sea if it had been acted upon. (See ALABAMA CLAIMS.) He became Solicitor-General in 1863 and Attorney-General in 1868. He was made a judge of common pleas for a few days in 1871 to enable him to qualify as a member of the judicial committee of the Privy Council. This action brought popular opprobrium upon the Gladstone government, but he served in that office until his death. He was made a peer in 1885.

MONLUC, or **MONTLUC,** môn'lụk', BLAISE DE (1502–77). A French warrior, historian, and autobiographer, born in Armagnac, near Condon, now in the Department of Gers. For 50 years he was abroad, always doing something, and he remembered what he had done. He shared in the campaigns of Francis I and got leave from him for the Duke d'Enghien to start the fight at Cérisoles (1544). Under Henry II in 1555 he held off the Emperor's troops at Siena. He fought the Huguenots in Guienne. A slash in the face caused him to withdraw for two years (1570–72), and in this forced repose he wrote his *Commentaires.* He detested letters, but the example of Cæsar set him to writing of what he had done and seen. Monluc wrote admirably, with the fire of a glory-loving Gascon. He was not in the least a philosopher, though he meant his *Commentaires* to be useful to posterity. Without understanding the movements of his time, he saw distinctly what went on about him. Monluc gives an extraordinarily vivid series of pictures of his adventures in France and Italy. His *Commentaires* are highly valuable to the historians, and their style makes them delightful reading to those who are simply looking for a man. Monluc died in Estilla, near Agen. Consult: *Commentaires et lettres de Blaise de Monluc,* edited by Ruble (Paris, 1864–72); Normand, *Les mémorialistes, Monluc* (ib., 1892); Paul Courteault, *Blaise de Monluc, historien* (ib., 1908), containing a bibliography.

MONMOUTH, mŏn'mŭth. A municipal borough and market town, the capital of Monmouthshire, England, situated amid beautiful scenery, at the confluence of the Monnow and the Wye, 18 miles south of Hereford (Map: England, D 5). It has ruins of former walls with a well-preserved gateway, and its fourteenth-century church is surmounted by a lofty spire. Of its castle, the favorite residence of John of Gaunt and the birthplace of Henry V, little remains. A building said to be the study of Geoffrey of Monmouth is all that exists of the Benedictine monastery. There is a seventeenth-century grammar school. Manufactures include tin plate, lumber, and chemicals. Pop., 1901, 5095; 1911, 5269.

MONMOUTH. A city and the county seat of Warren Co., Ill., 27 miles east by north of Burlington, Iowa, on the Chicago, Burlington, and Quincy, the Minneapolis and St. Louis, and the Rock Island Southern railroads (Map: Illinois, C 4). It is the seat of Monmouth College (United Presbyterian), founded in 1856, and has the Warren County Library and fine courthouse, Federal, city hall, and high-school buildings. There are farming, coal-mining, horse-breeding, and commercial interests, controlling a large trade in grain, produce, live stock, and in the principal manufactured products, which include agricultural implements, sewer pipe, pottery, oil cans, stoneware, soap, stump pullers, gloves, boxes, and cigars. Settled in 1836, Monmouth was incorporated first in 1852. The government, under a charter of 1874, is vested in a mayor, elected biennially, and a unicameral council. The city owns and operates the water works. Pop., 1900, 7450; 1910, 9128; 1914 (U. S. est.), 9839.

MONMOUTH, BATTLE OF. A battle fought June 28, 1778, during the American Revolution, near Monmouth Courthouse, in the town of Freehold, Monmouth, Co., N. J., between an American army under General Washington and an English army under Sir Henry Clinton. The latter, evacuating Philadelphia on June 18, retreated across New Jersey and on the twenty-sixth reached Freehold, whence on the twenty-seventh he started for Sandy Hook. Washington, following closely, resolved to attack Clinton's left wing, 8000 strong, marching in the rear, and detailed Gen. Charles Lee with 6000 troops to assail its flank until he could come up with the main division. Lee advanced accordingly, but, instead of attacking, intentionally wasted time in feinting and executing futile manœuvres and, after a little skirmishing, ordered a general retreat. Washington rapidly pushed forward, rebuked Lee with great severity, and, rallying the demoralized troops, checked the advance of the British, who made determined but unsuccessful attacks on the American left under Stirling and the American right under Wayne and Greene. The English then fell back and took up a strong position, but during the night withdrew to the heights of Middletown. Though usually claimed as a victory for the Americans, the battle was strategically drawn, neither side gaining any decisive advantage. The Americans lost 362 in killed, wounded, and missing, the British 416, among whom was Lieut. Col. Henry Monckton; many on each side were prostrated by the intense heat (96° in the shade). Lee was shortly afterward tried by court-martial for his conduct, was found guilty of disobeying orders and of making a shameful retreat, and was accordingly suspended from command for a year. Consult Dawson, *Battles of the United States* (New York, 1856), and Carrington, *Battles of the American Revolution* (ib., 1876).

MONMOUTH, GEOFFREY OF. See GEOFFREY OF MONMOUTH.

MONMOUTH, JAMES, DUKE OF (1649–85). A claimant to the English throne and a leader of the Monmouth insurrection. He was the son of either Charles II or Robert Sidney by Lucy Walters, and was born at Rotterdam, April 9, 1649. Charles, who recognized the boy as his son, committed him to the care of Lord Crofts, who gave him his own name. On the Restoration, Monmouth, then Mr. James Crofts, came to England with the Queen Dowager and was lodged at the royal palaces of Hampton Court and Whitehall. He was married in 1663 to Anne, daughter of the Earl of Buccleuch, and was created Duke of Monmouth, assuming as family name his wife's name of Scott. At the period of Titus Oates's plot (1678), rumors that the Protestant Duke was the King's legiti-

mate son spread far and wide, but the King declared solemnly before the Privy Council that he had never married Lucy Walters. Monmouth was sent into Scotland in 1679 for the purpose of quelling the rebellion of the radical Presbyterians. He defeated the Covenanters at Bothwell Bridge, but his humanity to the fleeing and wounded was so conspicuous and his recommendations to pardon the prisoners were so urgent as to bring upon him the violent censure of the King and Lauderdale. He thus became the idol of the English Nonconformists. The return of the Duke of York and the exile of Monmouth soon followed. In Holland he allied himself to the leaders of the Nonconformist party, exiled like himself, and when he returned to London he was received with such demonstrations of joy as to convince him that he was the people's choice as successor to his father. In 1680 he made a quasi-royal progress through the west of England with the design probably of courting the Nonconformists, and two years afterward he traversed some of the northern counties. The King and his brother were alarmed, and Monmouth was placed for a short time under arrest. In 1684 Monmouth went to the Netherlands and remained abroad until the death of Charles, whereupon he returned to England. Landing in 1685, he assumed the title of James II and headed a rebellion against the government. News of the defeat of Argyle, who at the head of the Scottish exiles had attempted an insurrection in Scotland, made Monmouth despondent. Nevertheless on July 6 he attacked a superior royal force which, under the command of the Earl of Feversham, was encamped at Sedgemoor, near Bridgewater. When his ammunition failed the Duke fled and his troops were massacred. Monmouth was found concealed in a ditch and was brought to London. Gaining an interview with the King, he made the most humiliating submission, but in vain, even the shortest respite being refused. On July 15, 1685, he was beheaded on Tower Hill. In the Bloody Assizes under Judge Jeffreys (q.v.), Monmouth's adherents paid a fearful penalty for their participation in his rash rebellion. Consult: Grey, *Secret History of the Rye-House Plot, and of Monmouth's Rebellion in 1685* (London, 1754); Collins, *Peerage of England*, vol. iii (5th ed., ib., 1779); Roberts, *Life, Progress, and Rebellion of James, Duke of Monmouth* (ib., 1844); Fergusson, *Robert Fergusson, the Plotter, or the Secret of the Rye-House Conspiracy and the Story of a Strange Career* (Edinburgh, 1887); Hyde, *Correspondence of Henry of Clarendon and James, Earl of Abingdon, Chiefly Relating to the Monmouth Insurrection, 1863–85* (Oxford, 1896); Allan Fea, *King Monmouth* (New York, 1902).

MONMOUTH COLLEGE. A coeducational institution, opened in 1856 at Monmouth, Ill., under the control of the United Presbyterian church. The college courses are arranged in nine groups, all leading to the degree of A.B. or S.B. There are preparatory and graduate departments and schools of music and art, with a total registration in 1913–14 of 438. The library contained about 10,000 volumes. The faculty numbered 26. The campus occupies 13 acres and with the buildings is valued at about $285,000. The endowment is $284,000 and the income $345,000. The president in 1915 was T. H. McMichael, A.M., D.D.

MONMOUTHSHIRE, mŏn'mŭth-shēr. A maritime county in west England, bounded south by the estuary of the Severn, northeast by Herefordshire, east by Gloucestershire, and west by Glamorganshire (Map: England, D 5). It has a coast line of 22 miles and an area of 546.2 square miles. The surface is elevated in the north and northwest, culminating in the Sugarloaf (1955 feet). The coast districts are low and fertile, being protected by sea walls, and in the valleys of the Usk, Monnow, and Wye wheat, barley, and oats are grown. The county is celebrated for its mineral wealth and abounds in collieries and ironworks. The scenery is unusually varied and beautiful, and its picturesqueness is enhanced by numerous Roman antiquities and the feudal remains of Raglan, Caldecot, and Chepstow castles and Llanthony and Tintern abbeys. Until the reign of Henry VIII, Monmouth was part of the Kingdom of Gwent, South Wales, and the Welsh language is still spoken very widely. Chief towns, Newport, Abertillery, Ebbw Vale, Tredegar, and Nantyglo and Blaina. Capital, Monmouth. Pop., 1901, 298,076; 1911, 395,778.

MONNA VANNA, mŏn'â vân'â. An opera by Février, first produced in Paris, Jan. 13, 1909; in the United States, Dec. 4, 1913 (Boston).

MONNIER, mô'nyā', Henri Bonaventure (1805–77). A French caricaturist and author, born in Paris. He first won attention by pen sketches and lithographic illustrations of Béranger (1828), which revealed his power of catching typical traits. Thus he was led to write and illustrate such comic yet faithful records of Paris street life as *Scènes populaires* (1830) or the *Mémoires de M. Joseph Prudhomme* (1857). In 1831 he became an actor, excelling in plays of his own writing; but he soon abandoned the stage. Many of his later pictured stories have been adapted for dramatic presentation, e.g., *Un voyage en Hollande*, *Les bourgeois de Paris*, and *Le bonheur de vivre aux champs*. Consult Champfleury, *Henri Monnier, sa vie, son œuvre* (Paris, 1889), and Beraldi, *Les graveurs du XIXème siècle*, vol. x (ib., 1890).

MONNIER, Jean Marie Albert Marcel (1853–). A French explorer and author, born in Paris and educated at the Lycée Condorcet. In 1886–87 he explored the Andes and the Amazon. In 1891–92 he went with Captain Binger's African expedition to the Ivory Coast, and in 1894, as correspondent of the *Temps*, he began a three years' journey to French Indo-China, Japan, Korea, and China, returning from Peking to Bassora. Among his writings are: *Un printemps sur le Pacifique* (1885); *Des Andes au Pará* (1889); *Mission Binger; France noire* (1893); *Le tour d'Asie* (2 vols., 1899–1900), which received a prize from the French Academy; *Le drame chinois, juillet-août, 1900* (1900); *Itinéraires à travers l'Asie* (1901).

MONNIER, Marc (1827–85). A French writer, known mostly for his studies of Italy. He was born in Florence and passed the greater part of his life in Geneva, where he was professor at the university. His works include: *Etude historique de la conquête de la Sicile par les Sarrasins* (1847); *Lucioles* (1853), in verse; *Les amours permises* (1861); *Histoire du brigandage dans l'Italie méridionale* (1862); *La Camorra, mystères de Naples* (1863); *Pompéi et les Pompéiens* (1864); *La vie de Jésus* (1873), in verse; *Contes populaires en Italie* (1880); *Le charmeur* (1882); *Un aventurier du siècle dernier, Le comte Joseph Gorani* (1884);

Histoire de la littérature moderne; La renaissance de Dante à Luther (1884), followed by *La réforme de Luther à Shakespeare* (1885).

MO'NO. A general term used in southern California for the Shoshonean tribes.

MONOC'ACY, BATTLE OF. A battle fought at Monocacy Junction, Md., about 5 miles from Frederick, on July 9, 1864, during the Civil War, between about 6000 Federals under Gen. Lew Wallace and about 20,000 Confederates under General Early. The Federal force was defeated, but succeeded in delaying Early's march upon Washington, and thus rendered a valuable service. General Grant, in his *Memoirs*, says: "General Wallace contributed on this occasion, by the defeat of the troops under him, a greater benefit to the cause than often falls to the lot of a commander of an equal force to render by means of a victory."

MONOCEROS, mŏ-nŏs'ĕr-ŏs (Lat. *monoceros*, Gk. *μονόκερως*, unicorn, from *μόνος, monos*, single + *κέρας keras*, horn), or the **UNICORN.** A constellation lying on the celestial equator directly south of Canis Minor and east of Orion. It contains no stars brighter than the fourth magnitude, but is rich in nebulæ, clusters, and multiple stars. RW Monocerotis is an Algol variable, with a period of 1.9 days.

MONOCEROS. A gastropod. See GASTROPODA.

MON'OCHORD (Lat. *monochordos, monochordon*, from Gk. *μονόχορδον*, monochord, neut. sing. of *μονόχορδος, monochordos*, having a single chord, from *μόνος, monos*, single + *χορδή chordē*, string). A very ancient musical instrument used to determine the mathematical proportions of intervals. It consists of a single string stretched over a sounding board. Any division of this string is obtained by means of a movable bridge sliding on a graduated scale. In this manner every interval can be produced with absolute acoustic purity. During the Middle Ages the monochord was used to illustrate intervals sounding simultaneously, and for this purpose several strings, each with a separate bridge, were added. In this form it became the precursor of the clavichord (q.v.). See Plate of MUSICAL INSTRUMENTS.

MON'OCHROME (ML. *monochroma*, from Gk. *μονόχρωμος, monochrōmos*, having a single color, from *μόνος, monos*, single + *χρῶμα, chrōma*, color). A painting done in the various shades of a single color. See CAMAIEU.

MON'OCLINE (from Gk. *μόνος, monos*, single + *κλίνειν, klinein*, to incline). A geological term applied to an abrupt inclination of strata connecting the same beds lying at different levels. A monocline may be regarded as a modified form of the anticline (q.v.). Folds of this character are developed on a grand scale in the Rocky Mountain region.

MONOCLINIC (mŏn'ō-klĭn'ĭk) **SYSTEM.** See CRYSTALLOGRAPHY, and Plate of CRYSTAL FORMS.

MON'OCOT'YLE'DONS (from Gk. *μόνος, monos*, single + *κοτυληδών, kotylēdōn*, cup-shaped cavity, from *κοτύλη, kotylē*, socket). One of the two primary divisions of angiosperms, the other division being called dicotyledons. The two groups are distinguished from each other by the following four prominent characters: (1) the embryo of a monocotyledon has a single and apparently terminal cotyledon, while the embryo of a dicotyledon has two well-developed lateral cotyledons; (2) in the mature stem of most monocotyledons the vascular bundles are scattered, while in dicotyledons they are arranged so as to form a vascular cylinder inclosing pith; (3) the leaves of monocotyledons have a closed venation (i.e., veinlets do not end freely in the margin, which is usually entire), while the leaves of dicotyledons have an open venation, veinlets ending freely in the margin, which is often toothed or lobed; (4) the flowers of monocotyledons usually have their members in sets of three, while those of dicotyledons more commonly have their members in sets of five or four. These characters are by no means of equal value, the character of the embryo being the only one without numerous exceptions. There are monocotyledons with regular vascular cylinders, with open venation, and with flowers not in threes; and there are dicotyledons with scattered vascular bundles, with closed venation, and with flowers in threes. It is not so much a single character, therefore, that distinguishes a monocotyledon from a dicotyledon, as a combination of characters. Formerly monocotyledons were called endogens, but the name has been abandoned in this connection, having been given upon a misconception, and is now applied in a totally different way. Until recently the monocotyledons were supposed to represent the primitive stock of the angiosperms. This idea arose from the fact that certain leaves with parallel veins which occurred in the Mesozoic and Paleozoic formations were thought to be the leaves of monocotyledons. These have now proved to be the leaves of gymnosperms, and there is no evidence of the monocotyledons until comparatively late in the Mesozoic. In fact, it has now been proved that the dicotyledons were the primitive angiosperms and that the monocotyledons have been derived from them as a specialized branch. The principal evidence has come from the study of the vascular anatomy of the two groups. It is now known that seedling monocotyledons contain the vascular cylinder of dicotyledons; that this cylinder is retained by some adults, but that in most cases the dicotyledonous cylinder becomes gradually transformed into the cylinder of scattered bundles, which is characteristic of the adult stems of monocotyledons. The monocotyledons comprise about 20,000 species, which are grouped into 10 orders. The first six orders constitute the more primitive spiral series, in which the parts of the flower are indefinite in number, although occasionally the characteristic number three emerges. The remaining four orders constitute the cyclic series, the highly specialized monocotyledons, in which the parts of the flower are definitely in threes. The most prominent orders of the spiral series are the Pandanales, which include the screw pines and cat-tails; the Helobiales, a very characteristic aquatic or marsh line, including the pondweeds; the Glumales, or grasses and sedges, the greatest order of monocotyledons in point of numbers; the Palmales, or palms; and the Arales, or aroids, which are peculiar among monocotyledons in often having leaves resembling those of the dicotyledons. The chief cyclic orders are the Liliales, including not only lilies but also the species of the amaryllis and iris families; also Scitaminales, to which banana, ginger, and canna belong; and, finally, Orchidales, or orchids. See DISTRIBUTION OF PLANTS.

MONOCYCLIC (mŏn'ō-sīk'lĭk, -sī'klĭk) **PLANTS.** See ANNUALS.

TYPES OF MONOCOTYLEDONS

1. AN ORCHID (Lady's-slipper).
2. A LILY (Dog's-tooth violet).
3. A GRASS (Sugar-cane).
4. A PALM (Date-palm).

MONOD, mô'nô', ADOLPHE (1802–56). A French Protestant minister. He was born at Copenhagen, his father having been a Reformed clergyman from Geneva. He studied in Paris and Geneva and was pastor of a small Protestant congregation at Naples (1825–27). In 1828 he became pastor at Lyons, where he remained till 1831 and founded the Free Evangelical church. In 1836 he was appointed professor of theology at Montauban and held this position for 11 years. During this time he traveled in southern France, preaching and instructing the people who were attracted by the power of his discourses. In 1847 he became pastor at Paris, where he drew large crowds by his eloquent preaching. His literary works were chiefly sermons (4th ed., Paris, 1866) and *A. Monod's Farewell to his Friends and to the Church* (Eng. trans., London, 1857). Consult S. M. (a daughter), *Life and Letters of A. Monod* (London, 1885).

MONOD, FRÉDÉRIC (1794–1863). A French Protestant, brother of Adolphe Monod. He was born in Monnaz, Canton of Vaud, Switzerland; was educated at Geneva; entered the ministry in 1820 and the same year succeeded his father as pastor of the National Protestant Church of France in Paris. He established in 1824 the *Archives du Christianisme*, the chief organ of the Evangelical French Protestants, and continued its editor until his death. After officiating 12 years as pastor of the oratoire, he united with Count Gasparin and others in an attempt to restore a rule of faith in the Reformed church which would exclude rationalists by making an acknowledgment of the divinity of Christ essential to membership. Failing in this, they left the National Protestant church in 1849 and organized independent congregations, which resulted in the formation of the Free Evangelical Church of France. Consult G. Monod, *La famille Monod* (Paris, 1890).

MONOD, GABRIEL (1844–1912). A French historian, born at Havre. He studied at the Ecole Normale and in Italy and Germany and in 1869 began to teach at the Ecole des Hautes Etudes, where he became director of the historical-philological section and president, and from 1905 to 1910 was professor at the Collège de France. His literary output was not great, but his influence as a conscientious research scholar was wide. Monod was an editor of the *Revue Critique* and founded (1876) with Fagniez the *Revue Historique*. Of the latter journal he had entire charge after 1885. He wrote *Allemands et Français* (1871); *Etudes critiques sur les sources de l'histoire mérovingienne* (1878–85); *Jules Michelet* (1875); a very important *Bibliographie de l'histoire de France* (1888); *Les maîtres de l'histoire, Renan, Taine, Michelet* (1894); *Portraits et souvenirs* (1897); *Souvenirs d'adolescence* (1903); *Jules Michelet, études sur sa vie et ses œuvres* (1905). He also contributed largely to the reviews.

MON'ODEL'PHIA (Neo-Lat., from Gk. *μόνος, monos,* single + *δελφύς, delphys,* womb). The largest and highest of the subclasses or infraclasses of mammals, equivalent to Eutheria (q.v.). This term, now passing into disuse, refers to the fact that the vagina and uterus in the female are always single. Compare ORNITHODELPHIA; DIDELPHIA.

MON'ODY (Lat. *monodia,* from Gk. *μονῳδία,* solo, lament, from *μόνος, monos,* single + *ᾠδή, ōdē,* song, ode, from *ἄδειν, adein,* to sing). Originally a name for an ode sung by a single actor in a Greek tragedy, and hence its connotation of sadness, as of the dirge. In later Greek usage it became also a name for a funeral oration. In English literature it is a name for an elegy or dirge in which a single mourner expresses grief over the dead. Examples of it are Milton's *Lycidas,* Shelley's *Adonais,* Arnold's *Thyrsis.* In music it is a name for a composition in the homophonic style.

MONODY. A style of music which first was cultivated in Italy about 1600. Up to that time serious composers had always used polyphony (q.v.). The Renaissance awakened a deep interest in the works of the ancient Greek dramatists, and in Florence a number of learned musicians and literary men attempted to reconstruct the music of those plays. It was felt that the polyphonic style, employing a number of voices, was not suited to accompany the words of a drama, where distinct enunciation of every word was the prime consideration. Attempts were made to write for a solo voice with instrumental accompaniment. For this purpose famous madrigals (see MADRIGAL) were arranged so that one part was assigned to the voice, while the others were played on some instrument. The inadequacy of this soon made itself felt, and composers began to write original compositions for a solo voice. This new style, employing only one voice, was called *monody,* as against polyphony, a style with many voices. The instrumental part of the earliest of these compositions is exceedingly primitive, consisting of scarcely more than a figured bass (q.v.). But with the establishment of the opera the progress of monody was very rapid. Monody must not be confounded with *homophony* (q.v.), which is a later development, and which does not exclude elaborate contrapuntal work in the accompanying parts. See ARIA.

MONŒ'CISM (from Gk. *μόνος, monos,* single + *οἶκος, oikos,* house). The word means primarily the condition of a single household in plants, which means that the male and the female organs occur upon the same individual. In its original application, however, it referred to the fact that in many seed plants the stamens and pistils occur upon the same individual, but this application arose from the mistaken idea that stamens and pistils are sex organs. The contrasting term is diœcism, referring to the condition in plants in which the male and female organs occur upon different individuals. The application of the term to a nonsexual condition in the flowering plants is unfortunate, for it means that monœcism in mosses and ferns refers to one fact and in flowering plants to quite a different one. Among the mosses the monœcious habit is very usual, the same sexual plant (gametophyte) bearing both sex organs (antheridium and archegonium). Among the true ferns monœcism is almost universal, the characteristic small gametophyte (prothallium) bearing both antheridium and archegonium. With the introduction of heterospory (q.v.), however, the sexual plants are absolutely differentiated, one individual being male and another female. Since all the flowering plants are heterosporous, it follows that they are essentially not monœcious in the sense of the term as used among mosses and ferns. In the application of the term to stamens and pistils, however, rather than to sex organs, the majority of flowering plants are found to be monœcious; i.e., with

the stamens and pistils not only upon the same plant, but in the same flower.

MON'OGRAM (Lat. *monogramma*, from Gk. *μονογράμματος*, *monogrammatos*, consisting of a single letter, from Gk. *μόνος*, *monos*, single + *γράμμα*, *gramma*, letter, from *γράφειν*, *graphein*, to write). A character composed of two or more letters of the alphabet, often interlaced with other lines, and used as a cipher or abbreviation of a name. A perfect monogram is one in which all the letters of the word are to be traced. The use of monograms began at a very early date. They are found on Greek coins, medals, and seals, and are particularly numerous on the coins of Macedonia and Sicily. Both on coins and in manuscripts it was the practice to present the names of states and cities by monograms, of which above 500 are known, but some have not been deciphered. Monograms occur on the family coins of Rome, but not on the coins of the earlier Roman emperors. Constantine placed on his coins one of the earliest of Christian monograms which is to be traced in the recesses of the catacombs, composed of the first and second letters of XPιστος (Christus), a monogram which also appeared on the Labarum (q.v.) and was continued on the coins of the succeeding emperors of the East down to Alexander Comnenus and Theodorus Lascaris. We often find it combined with the first and last letters of the Greek alphabet (Rev. i. 8). Another well-known monogram is that of the name of Jesus, IHS, from the first three letters of IHΣοῦς, though sometimes explained as standing for the three Latin words *Iesus Hominum Salvator* (Jesus, Saviour of Men).

Popes, emperors, and kings of France during the Middle Ages were in the practice of using a monogram instead of signing their names. Almost all the coins of the French kings of the Carlovingian race bear their respective monograms, as also do those of Alfred and some of the other Saxon kings of England.

Painters and engravers in Germany and Italy have used monograms to a large extent as a means of distinguishing their works. In these the initial letters of their names were often interwoven with figures of a symbolical character, so as to form a rebus on the artist's name. The first typographers distinguished their publications by woodcut vignettes, whose invention is ascribed to the elder Aldus; but besides these each made use of a monogram or cipher, a series of which, well known to the bibliographer, fixes the identity of the ancient editions, German, Italian, and English, from the invention of printing down to the middle or end of the sixteenth century. For a detailed account of the monograms of early printers and others, consult: Herbert and Ames, *Typographical Antiquities* (London, 1749); Horne, *Introduction to Bibliography*, vol. ii (ib., 1814); Brulliot, *Dictionnaire des Monogrammes* (Munich, 1832–34); Duplessis and Bouchot, *Dictionnaire des marques et monogrammes de graveurs* (Paris, 1886–87); Leutsch, *Universal Monogram-Work* (Gera, 1893); A. Schiller, *Monogramme* (Ravensburg, 1897 et seq.); F. H. Rees, *Art of Monogram Designing and Engraving* (Rochester, N. Y., 1911).

MON'OGRAP'TUS (Neo-Lat., from Gk. *μόνος*, *monos*, single + *γραπτός*, *graptos*, marked with letters, from *γράφειν*, *graphein*, to write). A genus of extinct graptolites found in and characteristic of rocks of Silurian age. See GRAPTOLITE.

MO'NO LAKE. A lake in Mono Co., east central California. It lies in the Sierra Nevada and, like all inclosed lakes, is subject to changes in its water level, which, e.g., was 6380 feet in 1883, 6412 feet in 1899, and 6426 feet in 1909. It is surrounded by mountains rising 6000 to 7000 feet above its surface (Map: California, F 4). It is roughly circular in contour, its east-west axis measuring 14 miles and the north-south 10 miles; its area, including islands, is about 87 square miles. Its maximum depth is 152 feet, the average being about 61 feet. It has no outlet, and its waters are so salty that neither fish nor mollusks can live in them. Sodium carbonate and bicarbonate constitute nearly one-half of the salts held in solution, and these are therefore of considerable commercial value.

MON'OLITH (Lat. *monolithus*, from Gk. *μονόλιθος*, consisting of a single stone, from *μόνος*, *monos*, single + *λίθος*, *lithos*, stone). A monument, statue, obelisk, column, shaft, or other architectural object formed of a single stone. The obelisks of the Egyptians furnish early examples of monoliths (see OBELISK), and the Romans of the Imperial age habitually employed monolithic columnar shafts of large size and highly colored marbles and granites. (See COLUMN.) In India there are examples of monolithic temples, e.g., the Kylas at Ellora and some smaller temples at Dhumnar and other places. A monolithic block at Baalbek in Syria measures 70 by 21 by 14 feet. One of the most remarkable monoliths is the dome of the Mausoleum of Theodoric at Ravenna in Italy, 36 feet in diameter; while among modern examples may be mentioned the colossal porphyry sarcophagus of Napoleon beneath the dome of the Invalides, Paris. Monolithic tombs abounded in Lycia; two of these have been removed to the British Museum. See MEGALITHIC MONUMENTS.

MON'OMA'NIA (Neo-Lat., from Gk. *μόνος*, *monos*, single + *μανία*, *mania*, madness). A form of insanity in which there is one systematized delusion which dominates, while it does not impair, the intellect of the lunatic. The central delusion may be replaced in part by minor related delusions, and it may be concealed upon occasions or for a long period of time. Ability is not incompatible with this form of insanity. It is now termed paranoia (q.v.).

MON'OMET'ALLISM. See BIMETALLISM; MONEY.

MONO'NA, LAKE. One of the so-called Four Lakes (q.v.) of Wisconsin.

MONONGAHELA, mō-nŏn'gȧ-hē'lȧ. A city in Washington Co., Pa., on the Monongahela River, 31 miles south of Pittsburgh, on the Pennsylvania and the Pittsburgh and Lake Erie railroads (Map: Pennsylvania, B 7). It is in a productive coal region and is engaged largely in coal mining. The industrial establishments include glass and lamp factories, automobile-parts works, coke ovens, iron and steel works, machine shops, foundries, planing mills, paper mills, flour mills, etc. Settled as early as 1792, Monongahela was incorporated in 1873. The city has adopted the commission form of government. Pop., 1900, 5173; 1910, 7598.

MONONGAHELA, BATTLE OF THE. See BRADDOCK, EDWARD; FRENCH AND INDIAN WAR.

MONONGAHELA RIVER. One of the

head streams of the Ohio River. It is formed in the east-central part of Marion Co., W. Va., by the confluence at Fairmont of the Tygart and West Forks rivers, flows northeast across the Pennsylvania boundary to the mouth of the Cheat River, and thence north to its union at Pittsburgh, Pa., with the Allegheny, to form the Ohio River (Map: Pennsylvania, B 8). The main stream is 125 miles long, drains an area of about 7350 square miles, and is navigable throughout its length by means of dams and locks. The Tygart rises in the southern part of Randolph Co., W. Va., flows in a northerly direction, is about 100 miles long, and drains an area of about 1420 square miles. The West Fork rises in Upshur Co., W. Va., and flows northwest and then northeast to its junction with the Tygart. It is about 70 miles long. The principal tributaries of the Monongahela are the Cheat and Youghiogheny rivers. On the banks of the Monongahela, a few miles from Fort Duquesne (now Pittsburgh), the Anglo-American army of Braddock was defeated by the French and Indians on July 9, 1755.

MONO-PAVIOTSO. See SHOSHONEAN STOCK.

MONOPH'YSITES (Gk. *μονοφυσίτης, monophysitēs*, one who affirms the single nature of God, from *μόνος, monos*, single + *φύσις, physis*, nature). The name applied to a large number of Christians in the fifth and sixth centuries who maintained that Christ had only one nature, as against the orthodox doctrine that in him humanity and divinity were perfectly united without detriment to either. The Monophysites called the orthodox, by analogy, Dyophysites, i.e., believers in two natures (Gk. *δύο*, two, and *φύσις*). The controversy sprang out of the fourth-century discussions respecting the Trinity (q.v.), and the connecting link may be found in the speculations of Apollinaris of Laodicea (died 392), who held that, while the body and the lower or animal soul in Christ were those of a man, the rational soul was displaced by the divine Logos.

The Monophysite controversy passed through several preliminary stages. One of these is marked by the name of Nestorius, Patriarch of Constantinople, who held that there was a co-operation of the two natures of Christ, the human and the divine, and who was condemned by the Council of Ephesus (431), under the leadership of Cyril of Alexandria. (See NESTORIUS; EPHESUS, COUNCILS OF.) Another stage is connected with the monk Eutyches (q.v.), who held that Christ was from two natures which, after incarnation, united into one. He, too, was adjudged heretical (448), and although he was received back into fellowship by the "Robber Synod" of Ephesus (449), his vindication did not stand. Meanwhile Pope Leo I (440–461) had written to the Bishop of Constantinople his celebrated "Tome," or letter, in which he defined the Catholic doctrine of the two natures. This document was brought into requisition at the Council of Chalcedon (451), and upon it was based the official decree which set forth the orthodox Christology. According to this definition, Christ is "perfect in deity and perfect in humanity, truly God, and truly man, . . . one and the same Christ, in two natures without confusion, change, division, or separation." The adoption of the Chalcedonian decree may be regarded as terminating the theological and introducing the political period of the Monophysite controversy.

The problem at that time confronting the Empire was that of harmonizing the theologically discordant elements of the population. Christianity being the state religion, it was necessary for all to accept whatever doctrinal decisions might be reached by the proper authorities. But a large part of the Eastern church was strongly Monophysite and would not surrender its convictions in spite of the Council. The emperors themselves did not all think alike, although they all sought, if possible, to unify the opinions of their subjects. A usurper in the East, Basiliscus by name, issued a decree condemning the definition of Chalcedon (476), and while many of the Eastern clergy accepted his decree, a storm of opposition was aroused. A later Emperor, Zeno, endeavored to reach a compromise by his *Henoticon*, or instrument of union (482), which practically ignored what had been accomplished at Chalcedon and reverted to the Niceno-Constantinopolitan creed as the sole standard of orthodoxy. Pope Felix condemned the *Henoticon*, and the result was a schism between East and West, lasting for about 35 years (484–519). Before the close of the fifth century several national churches had been formed in the East, independent of Constantinople, yet patriarchal in their organization, and all professing the Monophysite faith, e.g., the Jacobites, Maronites, Armenians, Copts, Abyssinians, etc. (qq.v.). In Egypt some of the most extreme Monophysites separated from the Patriarch of Alexandria and formed a sect of their own. They were called Acephali, i.e., "without a head." Justinian (527–565), a champion of orthodoxy, attempted to induce his subjects to unite on the basis of the Chalcedonian decree, and partially succeeded, chiefly by forcing his will upon the Fifth Ecumenical Council (553). But his most important utterances on the subject pleased neither party, and by a sort of irony of fate at the close of his life he was said himself to have fallen into a heresy akin to Monophysitism. (Cf. Evagrius, *Hist. Eccles.*, iv, 39.) Only after the separation of the schismatic churches of the East, and, still more, after the rise of Mohammedanism, which forced Oriental Christians, in self-defense, to seek closer relations with Rome, did the long Monophysite struggle come to an end in the Orthodox church. The Monophysite churches continue their independent existence to the present day. The two-nature doctrine, as defined at Chalcedon, triumphed, in spite of its inherent difficulties, and remained the orthodox faith of Christendom.

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MON'OPLANE. See AËRONAUTICS.

MONOPLEGIA, mŏn'ō-plē'jĭ-ȧ. A term applied to paralysis of a single limb or set of muscles. See PARALYSIS.

MON'OPNEU'MONA (Neo-Lat. nom. pl., from Gk. *μόνος, monos*, single + *πνεύμων, pneu-*

mōn, lung). An order of fishes, so called from the simple, unified condition of the lung sac. It comprises a single family, Ceratodidæ, and genus, *Ceratodus*, in which the lateral jointed rays of the archipterygium are well developed. It represents a very ancient stock, of which only the barramunda (q.v.) of Australia now exists. Cf. DIPNOI.

MONOPO'DIAL BRANCHING (from Gk. *μονόπους*, *monopous*, single-footed, from *μόνος*, *monos*, single + *πούς*, *pous*, foot). The method of branching in which the axis of a plant develops continuously and the branches arise laterally. This method is in sharp contrast with dichotomous branching, in which branches arise by the forking of the apex. See BRANCHING.

MONOPOLI, mō-nōp'ō-lē. An episcopal town in the Province of Bari delle Puglie, Italy, situated on the Adriatic Sea, 25 miles southeast of Bari (Map: Italy, F 4). It is surrounded by walls and has a fortress constructed in 1552 by Charles V and a twelfth-century cathedral. It also has a Gymnasium and a technical school. Along the coast near by are curious tombs hewn out of the rock and the ruins of an ancient city. Weaving and dyeing are the principal industries. There are also manufactures of oil and soap and trade in olive oil and wine. Pop. (commune), 1901, 22,545; 1911, 24,104.

MONOP'OLY (Lat. *monopolium*, from Gk. *μονοπώλιον*, right of exclusive sale, *μονοπωλία*, *monopōlia*, exclusive sale, from *μόνος*, *monos*, single + *πωλεῖν*, *pōlein*, to sell). In the strictest sense, a grant of the crown or state to a private individual or corporation of an exclusive right to carry on a certain class of business or traffic. In a general and more modern sense it signifies such control of a given class of articles or of the traffic in them as will make it possible to raise their price higher than the level of prices fixed by free competition. A typical example of a monopoly of the first class is the grant of a patent right, which in effect gives the grantee an exclusive control over the production of and traffic in the patented article; a common example of monopolies of the second class is the exclusive control of mineral or other special products of land by virtue of ownership of the land. Monopolies may be classified as public or private according as they are vested in and exercisable by the government or by private individuals, associations, or corporations.

Private monopolies may be classified as (1) legal monopolies, resting upon a grant from the government of exclusive privileges for manufacture or sale; (2) natural monopolies, which are based upon the control of a limited natural product through the ownership of land or other natural resources, or of exclusive natural facilities for transportation; and (3) capitalistic monopolies, which hold their power over prices by virtue of the fact that an enormous capital is required in certain industries, so that an established plant always has a great advantage over a new competitor. This last form of monopoly is discussed at length under TRUSTS.

Legal monopolies have generally been granted to private persons for some real or ostensible service to the commonwealth. Sometimes such a grant was made primarily for fiscal purposes. Thus, the monopoly of the issue of bank notes in England, granted in the early part of the eighteenth century to the Bank of England, was a reward for the considerable services of that corporation to the national exchequer. In early times the exclusive right of sale or production of a commodity was frequently granted to individuals in return for a fixed sum paid into the public treasury. The danger, however, of such monopolies lay in the fact that the probable profits were as a rule underestimated through the influence of favoritism, with the result that the sums secured by the treasury were not commensurate with the vexation to the public. Too frequently these exclusive privileges were granted to court favorites whose actual services to the commonwealth merited no such reward. Monopolies by grant first acquired prominence in the reign of Elizabeth, when her frequent grants of monopolies in articles of common use were regarded as a great abuse and brought forth the protests of Parliament. Such articles as salt, leather, coal, soap, cards, beer, and wine were thus monopolized, and indeed there was hardly any article of common necessity of which the sale was not thus restricted for the benefit of the great. The practice was continued until the statute 21 James I, c. 3, known as the Statute of Monopolies, was enacted by Parliament in 1623. This statute abolished all existing monopolies with certain exceptions, as patents and manufactures of war supplies and materials, and forbade the creation of monopolies except by grant made by authority of act of Parliament.

Somewhat similar in character were the special prerogatives granted about this time to the East India and other trading companies. The monopoly of trade which was a characteristic of these companies was held by many to be a feature essential to their success. It may be remarked that monopoly privileges did not prevent failure on the part of the many companies which from time to time were established by France, though they may have been a valuable adjunct to the more vigorous administration of the English and Dutch companies.

The limited monopoly for a term of years which at the present time is granted to the holders of patents and copyrights is somewhat akin in principle to those just discussed, but is justified by other considerations of public policy. It differs from them in that the objects to which such rights pertain are essentially new creations, and the exclusive privileges which they convey act as a stimulus to productions which are of public benefit. While copyright aims to secure to writers a reward for their labors, there are, in general, few restrictions upon the use of these privileges. On the other hand, the aim of patent legislation is in some countries not only to stimulate invention, but to secure the widest utilization of improved processes. The monopoly which the patent right confers cannot be used, therefore, for the exclusive benefit of its possessor. Persons who fail to provide for the commercial utilization of their patents forfeit their rights. German law, e.g., provides for an annual fee for the issuing of patents which grows larger as time progresses, and under this law ineffective patents or those which are not commercially profitable lapse and cease to be a bar to further applications of the principle upon which they are based.

In the United States power of granting monopolies is subject to restrictions of both the United States and the various State constitutions. The question as to how far a State may grant exclusive privileges to conduct a business depends primarily upon the constitution of the State, and

hence is a question of constitutional law outside the scope of this article. The Fourteenth Amendment of the United States Constitution, which provides that "No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States, nor shall any State deprive any person of life, liberty, or property without due process of law," is a direct limitation upon the powers of a State to grant monopolies indiscriminately. It does not, however, prevent a State from giving exclusive privileges to conduct public callings upon the theory that power to regulate and control public callings was an essential right of the State, recognized at common law and not intended to be destroyed by the Fourteenth Amendment. Thus, the State may grant the exclusive right to operate public ferries, turnpikes, railroads, grain elevators, etc. Nor does the Fourteenth Amendment preclude a State from granting exclusive privileges in the proper exercise of its police power. The State may thus grant monopolies for the sale of liquor, or the erection of a slaughterhouse, or the conduct of a slaughtering business within a city. See CONSTITUTIONAL LAW; POLICE POWER; PUBLIC CALLING.

The United States Constitution expressly confers upon Congress the power of granting copyrights and patents to authors and to the originators of useful inventions. No other power to create monopoly is expressly vested in Congress, and it is probable that it is without such power, except when incidental to the exercise of powers expressly granted by the Constitution, as, e.g., the power to regulate commerce, borrow money, or collect duties and imports.

Natural monopolies exist where the conditions of the enterprise are such as to preclude competition. In a general way, economists sometimes speak of the possession of land as constituting a natural monopoly. As monopoly implies a lack of competition as well as special privilege, the term strictly applies only to cases in which the ownership of the privileges is centred in one person, or at least a very few persons capable of acting in harmony. Land and other natural resources, such as water power and mineral wealth, are so widely diffused that monopoly in a strict sense rarely arises from their ownership. The most important instances of the so-called natural monopolies arise in connection with certain public services, particularly in cities, and are usually connected with the right of way through public highways. Such services are the furnishing of gas, water, transportation, and communication in cities. As the right to make use of the city streets to lay gas and water pipes, electric conduits, or to build tramways cannot be granted to all, competition in furnishing such services is practically excluded. In some respects, particularly as concerns the right of way through municipalities, steam railroads belong in the same class. Competition among them is possible on a larger scale than among street railways, but they undoubtedly possess some elements of natural monopoly.

As the policy of the law has eliminated from our economic life legal monopolies which do not conform to the principle of public interest, so there is a growing demand that these natural monopolies shall be administered in the public interest. In its extreme form it calls for the municipalization of such enterprises, while many who are unwilling to accept this solution demand far greater caution in the granting of franchises and a much stricter supervision of the manner in which such franchises are used than has heretofore been common in American municipalities.

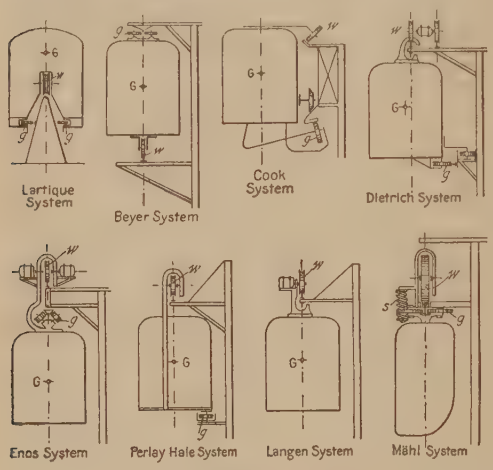
It can hardly be said that the price of the commodities or services controlled by a public monopoly is subject to any general law. The government may fix prices below cost of service, or it may purposely make them so high as to discourage consumption. Private monopolies, on the other hand, naturally aim to secure the greatest net profit; and the price which will yield the greatest surplus above cost may be termed monopoly price. The determination of such a price is a difficult matter in practice, since a large number of factors have to be taken into account. If the monopolized commodity is a necessity of life, as, e.g., salt, the price may be fixed very high, since high prices would not greatly diminish consumption. If, on the other hand, the commodity is an article of luxury, or one out of a group of commodities which satisfy the same want, a material rise in price will greatly limit consumption, so that while a large profit may be made on each unit sold, small sales will reduce total profits. Again, it may be that an increase in the quantity of service performed or goods produced will by no means demand a proportional outlay. In that case the monopoly may best subserve its own interests by keeping prices low. Thus, a street railway company can generally double the number of passengers carried without doubling the cost of service, and may therefore find it profitable to lower fares. See COPYRIGHT; PATENT; TRUSTS.

Bibliography. The most satisfactory recent general discussion of monopoly is Ely's *Monopolies and Trusts* (New York, 1900); also J. B. Clark, *Problem of Monopoly* (ib., 1904); John Lewson, *Monopoly and Trade Restraint Cases* (2 vols., Chicago, 1908); Hermann Levy, *Monopoly and Competition* (New York, 1911); O. W. Knauth, *Policy of the United States towards Industrial Monopoly* (ib., 1913). For a concise discussion of monopoly price, consult Marshall, *Principles of Economics* (London, 1895). A scholarly discussion of the theory of monopoly is Schäffle's *Theorie der ausschliessenden Absatzverhältnisse* (Tübingen, 1867). An interesting discussion of a fiscal monopoly is Wicksett, *Studien über das österreichische Tabaksmonopol* (Stuttgart, 1897); also, King, "Alcohol Monopoly in Switzerland," in *Economic Review* (New York, 1893), and Raffalovich, "State Monopoly of Spirits in Russia," in *Journal of the Statistical Society of London* (1901). See bibliography under TRUSTS.

MONOP'TERAL (from Lat. *monopteros*, from Gk. *μονόπτερος*, having a single row of columns, from *μόνος*, *monos*, single + *πτερόν*, *pteron*, wing, row of columns). A circular building in Græco-Roman architecture in which a single row of columns surrounds the central space without any wall. The term is Vitruvian and not in frequent use.

MON'ORAIL. A form of track and car or carriage designed to secure economy in rails and rail support, to permit of conformity to the surface of the ground, to allow curves of small radius, and usually with the object of securing high speed of transportation. The distinguishing feature of a monorail system is that the cars are supported on a single rail, though there may

be other rails or surfaces against which auxiliary or guiding wheels may bear. The possibilities of such a system have long been realized and the idea is said to date back to 1826, when it first was suggested by an English engineer, Robinson Palmer. Nevertheless, few of the many monorail systems devised by inventors have been reduced to successful practice, except over limited distances, and usually under temporary conditions or where their novelty was a paramount consideration, as at great expositions



TYPICAL MONORAIL SYSTEMS.

G, centre of gravity of car; *W*, carrying wheel; *g*, guide wheels; *S*, spring.

or amusement parks. The accompanying diagram shows the principles of the more important systems embraced in the above-mentioned groups.

The first monorail system to find practical application was that of Charles Lartigue, who in 1882 constructed in Algeria a line where a single iron rail was carried on A-shaped supports. In 1886, in Ireland, the Listowel-Balleybunion Railway, about 9¼ miles in length, was constructed, being operated for many years as a passenger and tourist line. This railway employs steam locomotives of unique pattern with duplex boilers, one boiler arranged on either side of the main driving wheel and rail. In France in the Ria mines in the Department of Pyrénées-Orientales, a line on the Lartigue system, about 6¾ miles in length, for the transportation of ore, was electrically operated with some success, while a recent application of this general principle was a monorail line at the Genoa, Italy, Exposition of 1914.

Perhaps the most practical of all the monorail systems has proved the Barmen-Elberfeld line, built on the Langen system, 13.3 kilometers in length, with 19 stations and carrying full-sized suspended cars. This line, operated by electricity, has been able to maintain satisfactory speeds and has proved distinctly useful. For maintaining high speeds the Mahl system, which is also of the suspended type, was carefully worked out in 1914, but did not find immediate application. In this design a track single or double, at a height of from 20 to 25 feet above the ground, is carried from well-anchored steel towers and from connecting cables in the fashion of a suspension bridge. The French engineer inventor in his specifications claimed that speeds up to 180 miles per hour were possible with high-speed electric motors, each car carrying a number of independent tractor elements. Various other monorail systems have been designed and have been operated on more or less experimental lines for short distances. Some of these, as at City Island, near New York City, were abandoned after a limited period of use, while others involving novel ideas have been shown at amusement parks or experimentally without any great practical or permanent success.

Distinct from such devices, where guide wheels on auxiliary rails or surfaces are used, are monorail systems in which gyroscopic appliances are employed to secure stability, as in the case of the automobile torpedo and the aëroplane. See TORPEDO.

The principle of the gyroscope (see GYROSCOPE) has found many ingenious applications which have shown extraordinary mechanical and mathematical reasoning. Three monorail systems based on this principle stand out with distinction as having realized a certain amount of experimental success and as having been developed further than the mere model stage.

The earliest practical device of this nature was that of Louis Brennan, the inventor of the Brennan torpedo, exhibited before the Royal Society of Great Britain in the spring of 1907. It was of course not strange that an inventor of torpedoes should turn his attention to transportation problems on land, and in 1907 he showed a model car 6 feet in length running along a single rail or cableway, able to maintain its position and equilibrium notwithstanding the shifting of the load. This car was supported on a single track by a bearing wheel, and electricity was applied to operate the driving motor and to revolve the flywheels of the gyroscope at a speed of 7500 revolutions per minute. The gyroscopic apparatus amounted to but 5 per cent of the total weight of the locomotive. On November 14, 1909, there was exhibited before the Royal Society a larger car, 14 feet in length, 13 feet high, and 10 feet wide, running on a single rail and carrying 40 passengers. This car weighed 22 tons and was driven by a gasoline engine which in addition supplied power to the gyroscopes. There were two of these, each weighing three-quarters of a ton and revolving at a speed of 3000 revolutions per minute. Friction losses were cut down as far as possible, and the wheels were incased so that they revolved in a vacuum. A circular track 220 yards in circumference was used, and the car was able to maintain its equilibrium while in motion, despite the efforts of its 40 passengers to destroy the balance by shifting their positions.

Another monorail or gyroscopic car, which differed from that of Brennan in having a so-called "precession motor," carried at the rear of the gyroscopes and operated by hydraulic pressure produced by an electrically driven oil pump, was brought out about the same time by a German capitalist named Scherl, by whose name it was known, although invented by Paul Froelich in 1909. A model locomotive car 18 feet in length and 4 feet in width, mounted on two two-wheel trucks, each carrying a ¾-horse-power motor, was tested both in Germany and in the United States. In this car there were two gyroscopes whose wheels normally rotated on a vertical axis in a horizontal plane. These flywheels weighed but 125 pounds each, and

were operated by electric motors at the speed of 8000 revolutions per minute. The motors were placed at the lower end of the shaft and, as in the Brennan machine, the wheels and shafts were mounted in air-tight casings and run in a vacuum, the casings themselves being mounted on transverse axes journaled into the frame of the car so that they could be moved fore and aft in a vertical plane. These motors revolved in opposite directions, but were connected by bell-crank levers and toothed quadrants, as the working of the gyroscope is always in opposite directions.

In the Schilowsky monorail system, developed in England by a Russian inventor, the gyro wheel has its plane of rotation above the axis of the pivots on which the containing cage is mounted. By a pendulum system any lurching of the car can be controlled through the gyroscope. This system up to 1915 had not been developed beyond the experimental stage, but an automobile equipped with such gyroscopic stabilizer of this inventor, though not employing a supporting rail, was found to work with considerable success. For those interested in mathematical and mechanical discussions the monorail system with its gyroscopic control presents considerable fascination. The reader so interested can with profit consult various papers in *Engineering* (London), the *Engineer* (ib.), *Le Génie Civil* (Paris), the *Journal of the Franklin Institute* (Philadelphia), particularly volumes clxix and clxxiv, and current issues of the *Scientific American* (New York); in all of which journals progress in this field is fully recorded from time to time.

MON'OTHEISM (from Gk. *μόνος, monos*, single + *θεός, theos*, god). The belief in, and worship of, one God only. It is usually contrasted with polytheism, the belief in many gods, but it also contrasts with dualism (q.v.) and monolatry, the belief in many gods but the worship of one only. While, strictly speaking, pantheism (q.v.) is a form of monotheism, the word monotheism is used to denote a belief in a single personal or quasi-personal power. There is no satisfactory evidence of monotheism in a savage tribe; still less that monotheism was the first form of worship. Where a savage tribe has a "supreme" god, investigation shows him to be only the highest, or the closest in relation to the tribe, of many spirits. His worship is usually monolatry rather than monotheism. Monotheism always arises out of some form of polytheism. Many steps in the history of religion mark the way towards monotheism, but often the journey stopped short of the goal. The mere arrangement of gods in a hierarchy starts a movement towards monotheism; for if one becomes king, like the Greek Zeus, he may go on to absorb all divinity into himself. The growth of a single tribe or city with its one tutelary deity moves towards monotheism, as is illustrated by the Assyrian Ashur. The abstraction of the idea of deity may open the way for personification of that abstraction into a single god; some suppose Allah to have originated thus. A synthesis of gods, recognizing that they all represent a single divine force, made in Egypt and later Babylonia a movement which might, carried farther, have issued in a true monotheism. Philosophy, searching for a single cause of the world, approached a monotheism in Plato, arrived at it in Neoplatonism (q.v.), and led to the most complete pantheistic monism in Hindu philosophy. An ethical monotheism arose among the Hebrews, on the basis of monolatry, through the prophetic conception that Jehovah governed the world in the interests of moral righteousness. The Hebrews were not monotheists till the triumph of the prophetic system in the sixth century B.C. There are a few cases of a temporary monotheism, like the unsuccessful attempt of Amenophis IV (Khuen-aten) to impose his God Aten on Egypt, but the great systems of monotheism belong only to the higher religions. Christian monotheism is taken over from the Hebrew; Mohammedan monotheism was strongly influenced by Hebrew thought, though the germs of it, in the worship of Allah, seem to be Arabic. Sikhism (q.v.) and the modern reforming sects of India borrow their monotheism from Islam and Christianity. Zoroastrianism (q.v.), however dualistic it may have been in antiquity, now claims to be purely monotheistic and regards Ahriman, the evil power, as the personified name for abstract evil and in no sense as a god.

Consult: R. Flint, *Theism* (Edinburgh, 1877); Harald Höffding, *The Philosophy of Religion* (New York, 1906); Irving King, *The Development of Religion* (ib., 1910); Andrew Lang, *The Making of Religion* (ib., 3d ed., 1910); C. H. Toy, *Introduction to the History of Religion* (Boston, 1913). See DUALISM; HENOTHEISM; THEISM.

MONOTH'ELITISM, more correctly **MONOTHELETISM** (from Lat. *monothelitæ*, from Gk. *μονοθελῆται, monothelētai*, from *μόνος, monos*, single + *θελητής, thelētēs*, one who wills, from *θέλειν, thelein*, to will). The name of a seventh-century heresy which asserted the existence of one will in Christ instead of two. It was a direct outgrowth of the Monophysite heresy (see MONOPHYSITES), for if Christ had only one nature, of course he had also only one will. Orthodoxy, however, drew the logical conclusion from its two-nature doctrine, which had been formulated at Chalcedon (451), and maintained that there were two wills in Christ, corresponding to his divine and human natures respectively. The controversy over this question involved most of the Eastern church, and its influence was felt in Rome. The Emperor Heraclius (610–641), threatened by the advances of Mohammedanism and by danger from the Persians, strove to reunite his Christian subjects, who had been sadly divided over the Monophysite question and had formed schismatic churches, e.g., Armenians, Jacobites, etc. He propounded the theory of one will in Christ as a compromise, and Pope Honorius accepted it, holding two natures with one will. Sergius, Patriarch of Constantinople, and Cyrus, Patriarch of Alexandria, were also anxious to interpret the decree of Chalcedon in such a way as to persuade the Monophysites to accept it. But a monk named Sophronius, who visited Alexandria and learned what was going on, denounced the movement as a relapse into the heresy of Apollinaris, whose views had long before this period been condemned. Honorius tried to allay this strife by seeking to quiet Sophronius, thus taking a dangerously temporizing stand. But Sophronius was soon elevated to the patriarchate of Jerusalem (634), and his continued opposition to the measures of Sergius and Heraclius was now more serious. The Western church, as a whole, shared the views of Sophronius. This appeared in the action of a Roman synod in 649, which asserted the doctrine

of the two wills. After some 30 years the Eastern church was brought to the same position, and the Sixth Ecumenical Council (Constantinople, 680) adopted dyothelitism (two wills) as a Catholic dogma. The same council condemned the Monothelite leaders, Sergius and Cyrus, and along with them Pope Honorius, for not promptly suppressing the incipient heresy. This properly ends the Christological controversies which for 300 years had agitated the Church. Monothelitism found a home among the Maronites of Mount Lebanon, and their name was long synonymous in the East with Monothelites. In the twelfth century the Maronites entered the Roman communion.

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MON'OTREME (Neo-Lat. nom. pl., from Gk. *μόνος, monos*, single + *τρῆμα, trēma*, perforation). A mammal of the order Monotremata, which is coextensive with the subclass Prototheria and embraces the low egg-laying mammals (Ornithodelphia) duckbill and echidna (qq.v.). The term connotes the fact that in the reproductive organs of this group the orifices of the urinary canal, the intestinal canal, and the generative canal open, as in birds, into a common cloaca. See PROTOTHERIA; for fossil forms, see MAMMALIA.

MONÓVAR, mō-nō'vär. A town of southeast Spain, in the Province of Alicante, situated among the mountains, 18 miles northwest of Alicante (Map: Spain, E 3). It has a number of good buildings, a large and handsome church, and a casino with a beautiful park. Great quantities of wine are produced in the vicinity, and the town manufactures woolen and cotton textiles, leather, soap, and spirits. In the neighborhood are quarries of marble, gypsum, and building stone. Nothing is known of its history previous to 1258, when James I rescued it from the Mohammedans. Pop., 1900, 10,573; 1910, 11,243.

MONRAD, mōn'rȧd, DITLEV GOTHARD (1811–87). A Danish statesman and ecclesiastic, born in Copenhagen, the son of a Norwegian. He studied theology and Oriental philology at the University of Copenhagen, spent a year in Paris, and after the death of Frederick VI entered political journalism as author of *Flyvende politiske Blade* (1840–42). In 1846 he had settled as pastor of a parish in Laaland. He took a prominent part in the rising of 1848, and was Minister of Education in the March ministry of that year. In 1849 he was made Bishop of Laaland-Falster; but in 1854, because of his continued opposition to Orsted's ministry, he was removed. In Hall's cabinet Monrad held various posts in the Department of Education and became Minister again (1859). Hall resigned in 1863. Monrad formed a new cabinet, in which he took the portfolio of Finance. But the war with Prussia forced him from power (1864), and with his family he went to New Zealand (1865), not to return until 1869, when his property there had been destroyed in the Maori campaigns. He received his old bishopric in 1871, and from 1882 to 1886 was a member of the opposition party of the Danish Parliament. Consult the biography by Graae (Copenhagen, 1887).

MONREALE, mōn'rā-ä'lā. A city in the Province of Palermo, Sicily, 5 miles southwest of Palermo, with which it has electric-railway connection (Map: Italy, D 5). It is built on the side of a mountain above a fertile valley, and is the seat of an archbishop. Its metropolitan cathedral, dating from the twelfth century, is the finest example of the Norman-Sicilian style extant. The bronze doors are beautifully ornamented and the walls are almost completely covered with mosaics representing biblical scenes. The Benedictine monastery, with its beautiful cloisters, is now used as a school building, and has a library of 17,000 volumes. There is a trade in oil, corn, fruit, and almonds. Pop. (commune), 1901, 23,778; 1911, 20,103.

MONREALE, FRA. See MONTREAL D' ALBANO.

MONRO, mŭn-rō', ALEXANDER (PRIMUS) (1697–1767). An eminent Scottish anatomist, born in London. He graduated at Edinburgh University, to which, after studying under Cheselden and Boerhaave, he returned as first professor of anatomy. He published *Osteology: A Treatise of the Anatomy of the Human Bones* (1726; 6th ed., 1758). Consult the memoir by his son, Dr. Donald Monro, prefixed to the collected edition of his *Works* (Edinburgh, 1781).

MONRO, ALEXANDER (SECUNDUS) (1733–1817). A Scottish anatomist, younger son of Alexander Monro (Primus), whom, in 1764, he succeeded as professor of anatomy in the University of Edinburgh. He continued to lecture there until 1808, when he was succeeded by his son, Alexander Monro (Tertius). His most important work is his *Observations on the Structure and Functions of the Nervous System* (1783), in which he describes the "foramen of Monro." Consult Andrew Duncan, *Account of the Life, Writings, and Character of the Late Dr. Alexander Monro Secundus* (Edinburgh, 1818).

MONRO, DAVID BINNING (1836–1905). An English classical scholar, born at Edinburgh. He was educated at the University of Glasgow and at Brasenose and Balliol colleges, Oxford. From 1882 to his death he was provost of Oriel College, Oxford. His works include *A Grammar of the Homeric Dialect* (2d ed., 1891), a standard work; *Modes of Ancient Greek Music* (1894); an edition of the *Odyssey*, xiii–xxiv (1901), with valuable appendices, especially on aspects of the Homer Question and on the Cyclic Poets; *Homeri Opera et Reliquiæ*, a critical text of Homer (1896); and the article "Homer" in the eleventh edition of the *Encyclopædia Britannica*. Consult J. C. Wilson, *Memoir of D. B. Monro* (Oxford, 1907).

MONROE'. A city and the county seat of Walton Co., Ga., 62 miles by rail east of Atlanta, on the Gainsville Midland, the Greene County, and the Monroe railroads (Map: Georgia, C 2). There are two large cotton mills and a cottonseed-oil mill. The surrounding region is adapted to the growing of cotton, corn, oats, peaches, and vegetables. Monroe owns its water works and electric-light plant. Pop., 1900, 1846; 1910, 3029.

MONROE. A city and the parish seat of Ouachita Parish, La., 76 miles west of Vicksburg, Miss., on the Ouachita River, and on the Arkansas, Louisiana, and Gulf, the Vicks-

burg, Shreveport, and Pacific, and the St. Louis, Iron Mountain, and Southern railroads (Map: Louisiana, E 1). The Federal government building, courthouse, the St. Francis Sanitarium, city hall, city park, high schools, and salt-water natatorium are noteworthy features. A considerable cotton trade is carried on and there are large cotton compresses, cottonseed-oil mills, and extensive manufactures of automobile and wagon materials, and other lumber products, bricks, etc. The city owns and operates its water works, street railways, sewage system, markets, and electric-light plant. Monroe is one of the oldest towns in the State. During the Spanish and French domination of this territory it was known as Fort Miro, its first commander being Don Juan Filhiol, many of whose descendants still live here. The city was first incorporated in 1820. Pop., 1900, 5428; 1910, 10,209; 1914 (U. S. est.), 12,246; 1920, 12,675.

MONROE. A city and the county seat of Monroe Co., Mich., 35 miles south-southwest of Detroit, on the river Raisin, and the Michigan Central, the Pere Marquette, the Lake Shore and Michigan Southern, and the Detroit and Toledo Shore railroads (Map: Michigan, F 7). It has a home for the aged, a public library, St. Mary's Academy and College, and a fine courthouse. In Monroe is the mother house of the Sisters of the Immaculate Heart of Mary, who own valuable property here. The city is in a fertile region and is an important depot for shipment of grain and fruit. It has extensive nurseries, fisheries, and, among the industrial plants, a large box-board factory, stove and furnace works, flour, lumber, and paper mills, canning factories, agricultural-implement works, furniture factories, etc. Monroe was chartered as a city in 1836. The commission form of government was adopted in 1914. The city owns its electric-light plant. Pop., 1900, 5043; 1910, 6893; 1920, 11,573.

Monroe was settled as Frenchtown by a company of Canadians in 1784, and received its present name, in honor of James Monroe, in 1815. It was the scene of the battle of the river Raisin, Jan. 22–23, 1813, in which 397 of the American force were killed and 537 captured, only 33 escaping, while of the British 24 were killed and 158 wounded. A number of the prisoners wounded and unable to march were left here under inadequate protection and were subsequently massacred by the Indians. This gave rise to the battle cry, "Remember the river Raisin."

MONROE. A city and the county seat of Union Co., N. C., 24 miles southeast of Charlotte, on the Seaboard Air Line Railroad (Map: North Carolina, B 3). It has gold mines of some value and the manufactories include large cotton and knitting mills, tile factory, flour and oil mills, wagon factory, lumber mills, and a buggy factory. The water works and electric-light plant are owned by the city. Pop., 1900, 2427; 1910, 4082.

MONROE. A city and the county seat of Green Co., Wis., 37 miles south by west of Madison, on the Illinois Central and the Chicago, Milwaukee, and St. Paul railroads (Map: Wisconsin, D 6). It has extensive manufactures of Swiss, Limburger, and brick cheese and also of condensed milk, lumber, carriages, foundry and machine-shop products, boilers, etc., and enjoys considerable trade in the products of the adjacent region, which is interested chiefly in farming, stock raising, and dairying. The city maintains a public library, county courthouse, and a park. Monroe was incorporated as a village in 1859 and in 1882 was chartered as a city. The water works are owned by the municipality. Pop., 1900, 3927; 1910, 4410.

MONROE, Fort. See Fort Monroe.

MONROE, Harriet (1860–). An American poet and editor, born in Chicago. She graduated from the Visitation Academy at Georgetown, D. C., in 1879; wrote the text for the cantata for opening the Chicago Auditorium in 1891; and on Oct. 21, 1892, her *Columbian Ode* (published 1893) was read and sung at the dedication ceremonies of the World's Fair at Chicago. In 1912 she founded and became editor of *Poetry*, an endowed magazine of verse. Miss Monroe is author of *Valeria, and Other Poems* (1892); *John Wellborn Root—A Memoir* (1896); *The Passing Show—Five Modern Plays in Verse* (1903); *The Dance of the Seasons* (1911); *You and I—Poems* (1914).

MONROE, James (1758–1831). The fifth President of the United States. He was born in Westmoreland Co., Va., April 28, 1758. In 1774 he was sent to William and Mary College to be educated, but his studies were interrupted by the outbreak of the Revolutionary War, and in 1776 he left college to join the Third Virginia Regiment near New York with the rank of lieutenant. He took part in the battles of Harlem Heights, White Plains, and Trenton, in the last of which he was wounded. During the campaigns of 1777–78 he served on the staff of the Earl of Stirling (William Alexander), ranking as major and taking part in the battles of Brandywine, Germantown, and Monmouth. Although his services were highly commended by the commander in chief, Monroe was disappointed in the way in which they were rewarded, and his career in the army after 1778, when with the rank of lieutenant colonel he was commissioned to raise a new regiment in Virginia, was unimportant. It was at this time that he formed an acquaintance with Jefferson, who was then Governor of Virginia, and the event marks the beginning of an intimacy that lasted during the remainder of their lives and was destined to have a decisive influence upon the career of Monroe. In 1782, at the age of 24, he was elected to a seat in the Legislature of Virginia and became a member of the Virginia Executive Council. His next legislative service was in the Congress of the Confederation, of which he was an influential member for three successive terms from 1783 to 1786. He took a prominent part in the deliberations upon the vital questions of the period, contending vigorously for the right of Congress to regulate commerce, for the right of free navigation of the Mississippi by the United States, and for other measures designed to promote the development of the West. To inform himself of conditions in the West, he twice crossed the Alleghanies, and the information which he acquired had a marked influence upon his course in Congress. Upon his retirement from Congress in 1786 he was again chosen to a seat in the Legislature and in 1788 became a member of the State convention called to ratify the Federal Constitution. In this body he supported Patrick Henry in his futile opposition to the Constitution, making several lengthy arguments against ratification. In 1790 he was elected to a seat in the United States Senate, where he served until 1794. In the Senate he acted with the Anti-Federalists, opposing vigorously the administration

of Washington. He was nevertheless, in 1794, appointed Minister to France as the successor of Gouverneur Morris, the probable explanation of the appointment being his friendly attitude towards France and the desire of the President to offset the appointment of Jay, a stanch Federalist, as Minister to England. He arrived in France just after the fall of Robespierre and was received by the Convention, Aug. 15, 1794. In an address to the Convention he used expressions which, in view of the strained relations between the United States and France, did not meet with the approval of the administration, and, considering Jay's Treaty with England "as the most shameful transaction I have ever known of the kind," he did nothing to remedy France's attitude towards it as of the nature of a *casus belli*. He was accordingly recalled in 1796, and Charles C. Pinckney was appointed as his successor. Upon his return the reasons and propriety of his recall became the subject of a spirited controversy and caused party feeling to run high. For a time Monroe retired to private life, from which he was called to assume the governorship of Virginia in 1799, a position which he held until 1802. The accession of Jefferson to the presidency in 1801 insured Monroe's return to national politics, and in the following year he was again sent to France as an additional plenipotentiary to aid Robert R. Livingston in the negotiations already begun for the purchase of New Orleans and a district at the mouth of the Mississippi, and at the same time was instructed to negotiate with Spain for the purchase of the Floridas. After the conclusion of the treaty by which France sold Louisiana to the United States (1803), Monroe was sent as Minister to England and subsequently to Spain. A treaty was finally concluded with England, but, not being satisfactory to the President on the question of impressment and indemnity, it was never laid before the Senate. The negotiations with Spain for the cession of the Floridas were likewise unsuccessful. In 1807 Monroe returned to the United States, and his course was again the subject of controversy. Again he served in the Virginia Assembly and in 1811 was chosen a second time Governor of Virginia, but held the office only a short time, being called to the cabinet of President Madison as Secretary of State in the same year. He held this office until his elevation to the presidency in 1817 and for a time in 1814 and 1815 also acted as Secretary of War. As head of the War Department he took precautions for the defense of Washington against an attack from the British forces and won popularity by the vigorous measures which he adopted in the prosecution of military operations. In the year 1816, while in his fifty-ninth year, he was elected President of the United States, having received 183 electoral votes, against 34 cast for the Federalist candidate, Rufus King. Four years later he was re-elected, receiving every vote in the electoral college except one. This was due to the passing of the Federalist party, or, more correctly, to the breaking down of party lines, so that there were no longer Federalists or Republicans. The principal subjects which occupied the attention of the government during the eight years of Monroe's administration were the defense of the Atlantic seaboard, the encouragement of internal improvements, the Seminole War, the acquisition of Florida, the Missouri Compromise, and the relations with Europe in regard to South American affairs, which resulted in the annunciation of the permanent policy of the government known as the Monroe Doctrine (q.v.). Noteworthy events of a spectacular character during his term were the tour of the President through the East and the West and the visit of Lafayette. The period of his administration was known as the "era of good feeling," on account of the general prosperity of the country and the absence of party strife. Vast internal improvements were undertaken, and the westward movement of the population was marked. Five new States—Mississippi, Illinois, Alabama, Missouri, and Maine—were admitted to the Union.

At the close of his second term Monroe retired to private life, residing in Virginia and in New York, where he died July 4, 1831. During the year preceding his death he served as a member of the Virginia Constitutional Convention, this being his last public service.

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MONROE, PAUL (1869–). An American educator, born at North Madison, Ind. He graduated at Franklin College, Indiana, in 1890 and from 1895 to 1897 was fellow in sociology at the University of Chicago, where he took his Ph.D. in 1897. After two years as instructor in history at Teachers College, Columbia University, he became professor of the history of education at that institution (1899). He served as president of the education section of the American Social Science Association and as president of the Society of the College Teachers of Education. By the Bureau of Insular Affairs of the United States War Department he was appointed commissioner to report on the condition of the Philippine school system (1912–13). In the latter year he received the honorary degree of LL.D. from the University of Peking. His contributions to the study of the history of education gave Dr. Monroe an international reputation, and his textbooks have helped to give the subject a position of great importance in the training of teachers in the United States. To the whole field of education, however, his greatest contribution was as editor in chief of the *Cyclopedia of Education* (5 vols., 1910–13), a work dealing with every phase of education and its related subjects. In addition he published: *Source Book in the History of Education for the Greek and Roman Period* (1901); *A Text-Book in the History of Education* (1905); *Brief Course in the History of Education* (1907); *Principles of Secondary Education* (1914), as editor; and educational articles in the NEW INTERNATIONAL ENCYCLOPÆDIA.

MONROE, WILL SEYMOUR (1863–). An American educator and author, born at Hunlock, Pa. After teaching and serving as principal and superintendent of schools, he graduated from Stanford in 1894 and then studied

abroad at German and French universities. In 1896 he became professor of psychology at the Massachusetts State Normal School, Westfield, and in 1909 accepted a similar position at the New Jersey State Normal School, Montclair. He traveled extensively in Europe and wrote various books on European countries, including *Turkey and the Turks* (1907); *In Viking Land* (1908); *Sicily, the Garden of the Mediterranean* (1909); *Bohemia and the Czechs* (1910); *Bulgaria and her People* (1914). In the educational field he is the author of several works in psychology and also on the history of education: *Child Study Outlines* (1898); *Die Entwickelung des sozialen Bewusstseins des Kindes* (1899; also in Swedish, Flemish, and Bulgarian); *The Educational Labors of Henry Barnard* (1893); *Bibliography of Education* (1897); *History of the Pestalozzian Movement in the United States* (1905). He was associate editor of Monroe's *Cyclopedia of Education* (1911).

MONROE DOCTRINE. The term applied to the policy of the United States regarding foreign interference in American affairs. It takes its name from President Monroe, who in his message to Congress in 1823 first gave it formal announcement. It is properly considered the corollary of the Washington and Jefferson policy of neutrality towards all European affairs. In modern conception it is the policy of the United States to regard any attempt on the part of a European Power to gain a foothold in this hemisphere by conquest, or to acquire any new establishment in North or South America by whatever means, as an act hostile to the United States. Although the phrase "America for the Americans" was not employed in the message, it well expresses the philosophy which Monroe assumed as a fundamental postulate. Yet it does not contravene the right of any nation to enforce indemnity for injuries to its subjects, physical or financial, however jealously the United States would view such a proceeding, but applies only to territorial aggression by foreign Powers whether temporary or permanent, and to any attempt to establish or alter governments in America whereby outside Powers might secure predominance or control. The conception of the policy is one of gradual growth, and so far as it has authority in international law it rests upon the principle of the right of a sovereign state to protect its own interests from dangerous aggression. With the wide and complex development of modern American interests, appeal to this argument is strengthened; yet the assertion of the doctrine in its extreme form is always attended with the danger of grave international complications.

The doctrine is based upon two passages in Monroe's message and has a twofold relation—a noncolonization and a nonintervention feature. The first passage referred to the boundary dispute in the Northwest, then in issue between Russia, Great Britain, and the United States, Russia having attempted to exclude foreigners from commerce and fishing in disputed territory and waters extending to the fifty-first parallel of latitude. President Monroe said: "The occasion has been judged proper for asserting as a principle in which the rights and interests of the United States are involved that the American continents, by the free and independent conditions which they have assumed and maintained are henceforth not to be considered as subjects for future colonization by any European Powers." Both the conditions which inspired the passage and its language prove that it related to an acquisition of territory by original occupation or settlement; that it did not include acquisition by gift, purchase, or like voluntary transfer, or by conquest. Further, while the application of the principle was made only to territory immediately in dispute in the Northwest, in prospective consideration it involved the vast tracts of unclaimed land on the continent still unexplored and unoccupied, upon which the establishment of a European colony with the exclusive trade policies then professed by all continental governments could not fail to prejudice the trade relations of the United States. The controversy in question was settled by the Treaty of 1825 with Russia, but the doctrine formulated was again asserted in 1826 by President J. Q. Adams in the proposed instruction of the United States delegates to the Panama Congress (q.v.), its application, however, being limited to its adoption by each separate State as a protection of the territory claimed by that State, and not committing the Powers concerned as a body to a "joint resistance against any future attempt to plant a colony." The question, however, was not considered by the Panama Congress, owing to the nonarrival of the United States delegates, and this phase of the doctrine remained in abeyance for 20 years.

The second part of the Monroe message related to the proposed action of the Holy Alliance, or, more accurately, the European Concert, as announced by the resolutions of the Congress of Verona (November, 1822), directed against the system of representative government in Europe and aiming at the reimposition of the Spanish yoke upon the South American colonies, then in a state of revolt, the independence of which the United States had already recognized. This action of the Powers threatened English commercial interests already established with these States, and England, through George Canning, promptly proposed to the United States a joint declaration by the two governments against their action; but without awaiting a reply from this government, on Oct. 9, 1823, she gave notice to the French Ambassador, Prince de Polignac, of her unfriendly attitude. There are some who contend, on the other hand, that Canning had little or nothing to do with the announcement of the doctrine and who refer to such explanation as the Canning Myth; but this idea has found little acceptance among scholars. This, followed by President Monroe's declaration, summarily checked the Powers. "We owe it, therefore," said Monroe, "to candor and the amicable relations existing between the United States and those Powers, to declare that we should consider any attempt on their part to extend their system to any portion of this hemisphere as dangerous to our peace and safety. With the existing colonies and dependencies of any European Power we have not interfered and shall not interfere. But with the governments who have declared their independence and maintained it, and whose independence we have, on great consideration and just principles, acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European Power, in any other light than a manifestation of an unfriendly disposition towards the United States." While Monroe's

declaration was intended to meet the exigencies of the time, the principle was no novel one, but rather the embodiment of an idea that had developed with the growth of nationality and had been expressed in various forms in previous papers and correspondence of Monroe, Adams, and Jefferson. Two months before the publication of the message Jefferson had written: "Our first and fundamental maxim should be never to entangle ourselves in the broils of Europe; our second, never to suffer Europe to intermeddle with cisatlantic affairs." The declaration, having accomplished its purpose, practically disappeared in its application with respect to the Holy Alliance, and the development of the policy for the next generation was the outgrowth of the colonization feature.

It is supposed that the South American states, being in fear of European intervention in behalf of Spain, generally welcomed the announcement of the Monroe Doctrine; certainly its reception was cordial in Colombia, Brazil, and Buenos Aires. Colombia, in 1824, invited the armed assistance of the United States, but the cautious reply was given that, under the Constitution, the government could take such action only with the consent and by the authority of Congress. In Europe the doctrine was received with widely differing sentiments. In so far as the message was construed to interdict future colonization, it was generally opposed, even by Canning. Chateaubriand, Minister of Foreign Affairs in France, stated that the Powers should oppose the American policy.

In the time immediately succeeding the Monroe-Adams period the doctrine fell into disuse and disrepute in American politics, for the "Jackson men" held it as anathema because it had been championed by Adams. It was not invoked, despite the fact that there were European interventions in Uruguay and Paraguay. The doctrine was not announced with approval again until the administration of Polk, who adverted to it as the "Monroe Doctrine," and in 1845 he took the first step towards extension of the principle. The northwest boundary was again in issue, this time with Great Britain, and the administration was committed to the annexation of Texas. "It should be distinctly announced to the world," said Polk, "as our settled policy, that no future European colony or dominion shall, with our consent, be planted or established on any part of the North American continent." The doctrine was thus made to include acquisition by voluntary transfer or conquest of occupied territory, and a virtual guarantee of the status quo with reference to the territory of other American states in its application was announced, though limited to North America. Again in 1848, when the question of the occupation of Yucatan arose, Polk issued a second manifesto against the acquisition of such territory by voluntary transfer or cession. In 1853, when the Cuban annexation discussion was at its height, a resolution was introduced into the Senate combining the doctrines of Monroe and Polk; but it failed of passage. It is not a part of the statutory law of the land, though with the predominance of the interests of the United States the policy in relation to both North and South America has been generally accepted by both political parties and the people, and its principles have been given repeated recognition during the past half century in our foreign policy. President Grant, in the Santo Domingo episode of 1870, declared that, in accordance with the doctrine, there was no land on this continent subject to transfer to a European Power. The interference of the United States in Mexico, resulting in the withdrawal of the French in 1866, and President Cleveland's declaration to Great Britain in connection with the Venezuelan boundary dispute in 1895 are the notable examples of such recognition. Notwithstanding the protests of the United States government, during the progress of the Civil War, the French had secured a foothold in Mexico and attempted to install Maximilian, an Austrian prince, on a Mexican throne. With the conclusion of peace a formal demand for withdrawal was made, and General Sherman was sent to the Mexican frontier with a large force. After some delay in negotiations the French Emperor withdrew his troops, and Maximilian was left to his fate. Although Secretary Seward did not refer to the Monroe Doctrine by name, it was generally recognized that his action was based upon it. He admitted that France might wage war with Mexico, but not that she might raise up an anti-American government. In the Venezuelan affair, representations having been made by our government that the action of Great Britain was a violation of the Monroe Doctrine, the latter yielded to the suggestion of the United States and consented to an arbitration, thus effecting an amicable settlement. President Cleveland and Secretary Olney unquestionably gave the Monroe Doctrine a broader interpretation. After affirming that the United States would not relieve any American state of its obligations as fixed by international law, Olney stated his government would allow no European Power to "forcibly deprive an American state of the right and power of self-government and of shaping for itself its own political fortunes and destinies." In addition he declared that "to-day the United States is practically sovereign on this continent, and its fiat is law upon the subjects to which it confines its interposition." Despite this extension of interpretation, the most important results of the Venezuelan incident were the official adoption of the Monroe Doctrine by Congress, in its indorsement of the executive policy, and its acceptance by Great Britain. In 1901 the doctrine was defined again by President Roosevelt, and, after stating the accepted prohibition against territorial and political aggrandizement, he said: "This doctrine has nothing to do with the commercial relations of any American Power, save that it in truth allows each of them to form such as it desires." In 1904 he said: "Brutal wrongdoing, or impotence which results in the general loosening of the ties of civilized society, may finally require intervention by some civilized nation, and in the Western Hemisphere the United States cannot ignore its duty." This statement, made with respect to conditions in Santo Domingo, was understood to mean that in case the social, political, or industrial demoralization in any American state was sufficient to warrant intervention, the Monroe Doctrine imposed that duty upon the United States. At his urgence a treaty was negotiated with Santo Domingo whereby the United States assumed management and administration of her tariffs. Since the announcement of the Roosevelt extension it has been thought necessary to intervene frequently in the affairs of the smaller

Latin American states. President Wilson, in 1913, felt it expedient to issue the warning that the United States respects only "the orderly processes of just government based upon law and not upon arbitrary or irregular force." At Mobile, in the same year, he said: "I want to take this occasion to say that the United States will never again seek one additional foot of territory by conquest." Intervention, if permitted at all, it was presumed, should be in support of "true constitutional liberty" rather than for territorial, political, or economic advantage. In this speech he also stated that the United States would oppose the granting of economic concessions by Latin-American countries to outside interests which might have influence upon the political destiny of any such country.

The Monroe Doctrine is sometimes held to commit the United States to a protectorate over other American states, requiring this country to espouse their quarrels, though unable to control their actions. It has never been within its intent to forbid European nations to employ force in the settlement of their just demands upon this continent, provided that no acquisition of territory was contemplated. In 1842 Great Britain blockaded San Juan de Nicaragua; in 1851 she laid an embargo on the western coast of Salvador; in 1894 she occupied the Nicaraguan port of Corinto; and in 1903 the combined German and English fleets, after both governments had given assurances concerning the nonpolitical character of their designs, maintained a blockade of the Venezuelan coast to secure the collection of their claims for indemnity. The requirements of the Monroe Doctrine as a national policy were fully met with the assurance to the United States of good faith on the part of the Powers concerned and that no Venezuelan territory would be taken in settlement of the indemnity. It may be noted that the United States delegates at the first Hague Conference in 1899 stated distinctly that the Monroe Doctrine was a cardinal policy of their country, a declaration which was opposed by none of the delegates present. While the building of an interoceanic canal and the position which the United States has had as a world power since the close of the war with Spain have rendered the problems attending the application of the doctrine more complex, the increased respect which it has insured our demands has greatly decreased the difficulties of its enforcement.

The attitude of Latin America to the Monroe Doctrine has in the course of time undergone many changes, the respect for it being in many cases demonstrably due to the threat of outside danger. Among certain states, such as Argentina, Brazil, and Chile, there has developed a feeling of independence of it. In 1913 Señor Zeballos, rector of the University of Buenos Aires, in a speech of welcome to ex-President Roosevelt which was widely circulated and commended in South America, asserted that certain states had acquired sufficient stability and power as no longer to require the guarantees of the doctrine. In 1906, also, President Díaz, of Mexico, declared that the doctrine belonged to no one Power, but that it was Pan-American.

Although many have expressed doubts as to the existence and utility of a Monroe Doctrine, deeming its principles obsolete and considering the imperialistic policy of the United States to be so inconsistent with such doctrine as to be destructive of it, still, regarded as a limitation upon the extension of European power and influence in the Western Hemisphere, it must be acknowledged as the settled and recognized principle of American policy.

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MONRO'VIA. The capital of the negro Republic of Liberia, west Africa, situated at the mouth of the St. Paul River, on the coast (Map: Africa, C 4). It has an unhealthful climate. There is a government college with about 200 students and another conducted by Methodist missionaries. The city is the seat of a Protestant Episcopal bishop and of an American and a Roman Catholic mission. It is also a station of the German and the South American cable companies. Its exports are palm oil and kernels, coffee, ginger, fibre, cocoa, dyewoods, and rubber, the total trade in 1912 amounting to $2,634,375, chiefly with Germany and Great Britain. Pop., including the suburb of Krutown, about 6000, including some 120 Europeans.

MONS, môns. The capital of the Province of Hainaut, Belgium, situated on the Trouille, 35 miles southwest of Brussels (Map: Belgium, B 4). It was formerly encircled by a line of fortifications, but their site is now occupied by promenades. The most interesting building in Mons is the late Gothic cathedral of St. Waltrudis (1450–1589), with reliefs, stained-glass windows, and relics of the saint. The hôtel de ville is a late Gothic building of the fifteenth century, with a façade adorned with statuettes and a baroque tower. The educational institutions comprise a military engineering college of the Belgian army, a school of mines, a normal school, a seminary for teachers, a fine library with 80,000 volumes, and an archæological museum and picture gallery. Mons lies in one of the most important coal-mining districts of Belgium, known as Borinage, and manufactures woolen and cotton goods, iron products, cloth, lace, and sugar. The trade, mostly in grain and coal, is facilitated by the Canal de Condé, which connects with the Scheldt.

Mons occupies the site of a Roman fort built by Julius Cæsar. It attained some importance in the Middle Ages and owed not a little of its prosperity to Baldwin VI, Count of Flanders, later Emperor of Constantinople, from whom it

received a charter in 1200. It was repeatedly taken during the wars of Louis XIV. Mons was captured by the Germans in the European War which broke out in 1914. It was from here that the allied Anglo-French army began its slow, steady retreat which was not stopped until the battle of the Marne (see MARNE) was fought, in sight of the outer fortifications of Paris. (See WAR IN EUROPE.) Near by are the battlefields of Malplaquet and Jemappes. Pop., 1900, 25,483; 1910, 27,828.

MONS, or TALAING. The inhabitants of the unhealthy delta regions of the rivers Irrawaddy, Sittong, and Salwen in Indo-China. They consider themselves the aborigines of the whole of Lower Burma. Their former habitat is now largely occupied by Burmese-Mon half-breeds. They are probably one of the eight groups of aborigines of Indo-China. Their language seems to belong in the same class with the Khmer, and perhaps the Khasia. See INDO-CHINESE.

MONS BRISI'ACUS. See BREISACH.

MONSEIGNEUR, môn'sā'nyēr' (Fr., my lord; pl. *messeigneurs*). Originally a French title applicable to royal or Imperial princes, cardinals, archbishops, and bishops of France and accorded in courtesy to the high officers of court or government and persons generally of high rank. The title was not applied to bishops until about the close of the seventeenth century, when they acquired it by concerted action in addressing each other in that way. Their title previously was simply *monsieur*. A law of the French Convention in 1801 interdicted the use of the title for bishops and archbishops and required them to confine their signature titles and their addresses to each other to the words *citoyen* or *monsieur*. Among English-speaking Roman Catholics the title is applied in its Italian form, *monsignore*, not only to bishops, but to priests who are distinguished by the honorary appointment as domestic prelates to the Pope.

MON'SELL, JOHN SAMUEL BEWLEY (1811–75). A Church of England divine and hymn writer. He was born in Londonderry, Ireland, March 2, 1811, and graduated at Trinity College, Dublin, in 1832. He was ordained priest in 1835 and died as rector of Guildford, England, April 9, 1875. He was a popular hymn writer; Julian's *Dictionary of Hymnology* gives a list of 73 of his hymns which are in current use. Aside from collections of hymns, he published various books of prose and verse. One of his prose works, *Our New Vicar* (1867; 13th ed., 1890), has had a large sale.

MONSEL'S SOLUTION. An aqueous solution of basic ferric sulphate, corresponding to about 13.6 per cent of metallic iron. It is a dark reddish-brown liquid, odorless, and strongly styptic. It is used externally as a local astringent in cases of bleeding from the nose or other mucous cavities or from superficial skin wounds. The solution promotes clotting of the blood, but the clot is very disagreeable, readily decomposes, and may give rise to septic infection. It has therefore been largely superseded as a hæmostatic by adrenalin (q.v.), but is still applied to the inflamed pharynx or tonsils. See IRON.

MONSERRAT, môn'sĕr-răt' (*mons serratus*). A mountain and a monastery of Spain, situated 30 miles northwest of Barcelona, near Monistrol, a village on the Barcelona and Lerida Railway. The mountain, 4070 feet high, is strongly eroded, and the many deep ravines and steep precipices, together with its serrated summit, give it a very ragged appearance. The monastery, located at a height of 2910 feet, owes its origin to an image of the Virgin which was hidden in one of the mountain caves when the Moors invaded Spain. The popular belief asserts that the monastery was built during 880 as a home for the Virgin when, after the invaders had withdrawn and safety was again assured, the image refused to leave her mountain refuge. The mountain is rich in legendary lore, and in the mediæval German story it was believed to be the site of the castle of the Holy Grail.

MONSIEUR, *me-syĕ'*. A French title formerly addressed to persons of medium rank; now universally employed in French by all gentlemen in addressing each other. It is also used as a prefix to titles of rank and as a form of respect in mentioning a third person. In the Middle Ages the title was given to saints and as a prefix to the names of popes and of members of the royal family when alluded to in the third person. Later *Monsieur*, used without a proper name, was the special title of the oldest brother of the French King.

MONSIGNY, môn'sē'nyē', PIERRE ALEXANDRE DE (1729–1817). A French composer, born at Fauquembergue, Pas-de-Calais. He received some instruction in harmony from Gianotte, in Paris, and in 1759 produced his first opera, *Les aveux indiscrets*. Its success was immediate, and Monsigny followed it up with *Le cadi dupé* (1761). From this time he had the poet Sedaine as collaborator. Together they wrote: *On ne s'avise jamais de tout* (1761); *Le roi et le fermier* (1762); *Rose et Colas* (1766); *Le déserteur* (1769); *Le faucon* (1772). After *Félix, ou l'enfant trouvé* (1777; text by Sedaine), Monsigny ceased to write. In 1813 he succeeded Grétry (q.v.) as member of the Academy. Together with the latter and Philidor (q.v.), Monsigny must be regarded as the founder of the opéra comique. Even to-day some of his works are occasionally heard in France. Consult A. Pougin, *Monsigny et son temps* (Paris, 1908).

MONS JANICULUS. See JANICULUM.

MONSON, mŭn'sŭn. A town in Hampden Co., Mass., 20 miles east of Springfield, on the Central Vermont Railroad (Map: Massachusetts, C 4). It contains the Monson Academy. Monson is essentially an agricultural community, but has granite quarries, woolen mills, and manufactories of ladies' hats. The water works are owned by the town. Pop., 1900, 3402; 1910, 4758.

MONSON, SIR EDMUND JOHN, first BARONET (1834–1909). A British diplomatist, born at Chart Lodge, Kent. He was educated at Eton and at Balliol College, Oxford, and became a fellow of All Souls in 1858. Until his resignation in 1865 he was connected with the British legations at Paris, Florence, Washington, Hanover, and Brussels. He reëntered the government service in 1869 as Consul in the Azores, became Consul General in Hungary in 1871, and during the Turkish War in 1876–77 was on special duty in Dalmatia and Montenegro. After 1879 he was successively Minister to Uruguay, Argentine and Paraguay, Denmark, Greece, and Belgium, and Ambassador to Austria (1893–96) and to France (1896–1904). In 1888 he became arbitrator of the Butterfield

claim between the United States and Denmark, which claim grew out of the treatment of two vessels belonging to the American firm of Butterfield & Co. by the Danish authorities at the island of St. Thomas in 1854–55. Monson gave his decision in favor of the Danish government in 1900. He received the G.C.V.O. in 1903 and in 1905 was made Baronet.

MONSOON' (from Fr. *monson, monçon, mousson*, It. *monsone*, Sp. *monzón*, Portug. *monção*, from Malay *mūsim*, season, year, monsoon, from Hind. *mausim*, from Ar. *mausim*, monsoon, from *masama*, to mark). In general, any wind or system of winds that changes regularly with the months or seasons. This term was brought to England from the East Indies by the Portuguese, Spanish, and Italian navigators. Its use in English first occurs in *Hakluyt's Voyages*. In India, Siam, and the East Indies there is a very regular change of the winds with the seasons. They blow from southwest or south from April to October and from northeast or north from October to April. The existence of these winds in India was first made known to the Europeans by the expeditions of Alexander the Great. Modern knowledge of the corresponding winds in Siam and the Philippines dates from the middle of the sixteenth century; similar regular seasonal changes in the wind direction characterize many portions of the globe, so that Australia, Texas, Brazil, Africa, and Europe have prevailing winds at each season of the year; yet the contrast is nowhere so strongly marked as on the south and southeast coasts of Asia and the neighboring islands. During the winter season the cool air from the interior of the continent, flowing outward and keeping near the ground, becomes a north or northeast wind as it flows southward over the China Sea into the Bay of Bengal and into the Arabian Sea. This wind even passes beyond the equator to lat. 10° S., by which time it has been deflected into a west wind and flows eastward over the northwestern coast of Australia. South of this zone of north winds are the southeast trade winds of the Southern Hemisphere. By reason of the change from winter to summer the Asiatic continent becomes heated; consequently the northeast monsoon ceases and a strong indraft takes place, and eventually, in July and August, the greater part of the air over the south Indian Ocean responds to this indraft, so that from lat. 25° S. to lat. 5° S. a strong southeast trade wind prevails. Between lat. 5° S. and 5° N. this southeast trade crosses the equator as a southerly wind and, turning towards the right, becomes the southwest monsoon wind of India, Siam, and the adjacent seas. It was for a long time considered doubtful whether the winds of the Southern Hemisphere could thus cross the equator and enter the Northern Hemisphere, but the monsoon charts published daily for many years by the government of India leave us no room to doubt this remarkable change. In the midst of the southeast trades of the south Indian Ocean occur violent typhoons, which move from the neighborhood of Java and northern Australia westward and away from the equator, turning in their course before they reach Madagascar and moving southeastward until they are lost. These typhoons generally develop in the south Indian Ocean when the northeast monsoon is at its maximum in India.

The southwest monsoon is usually accompanied by rain in portions of India and in the adjacent East Indies. The northeast monsoon brings rain to the west coast of the Bay of Bengal. In general, the locations of the rain areas vary with the direction of the wind in accordance with the rule that a wind that is forced to ascend over a hilly coast brings rain to it. Through this interchange between the seasons of northeast and southwest monsoons, all of India has an opportunity of being well watered and of raising annual crops of grain. Nevertheless it occasionally happens that the southwest monsoon fails to bring much rain; this may indeed happen for several successive years (as in 1895 and 1896 and again in 1899), by reason of which distressing famines and great loss of life are caused. Since 1880 the government meteorologists of India, H. F. Blanford and John Eliot, have devoted a great deal of attention to methods of predicting the probable character of the monsoon rains. These predictions are generally issued in the month of April and relate to the coming months of July and August. A remarkably large percentage of these predictions have been successful, but the failure of the forecasts for 1899 indicated that abnormal conditions prevailed in some distant region and has greatly stimulated the study of the relation between the Indian monsoon and the condition of the atmosphere over the whole globe.

The general statement of the conditions that bring about monsoons is discussed at length by Prof. William Ferrel in *A Treatise on the Winds* (New York, 1889). He has emphasized the important rule that monsoons are stronger in proportion as the heated interior land surface is elevated above sea level. On the coast of Jamaica, West Indies, the diurnal sea breeze is remarkably strong, owing to the steep gradient of the land as it ascends from sea level to the tops of mountains. In India the southwest monsoon develops on a grand scale because of the average elevation of the Himalayas, which stretch east and west for 1300 miles at an average altitude of 18,000 feet, and also because of the mountains and plateaus behind the Himalayas in the interior of Asia. The monsoon, like the daily land and sea breeze, depends for its intensity ultimately on the heat produced by solar radiation. Any change in the radiation will produce corresponding effects on the monsoon. E. D. Archibald, in *Nature* (June 22, 1893, London), has maintained that there are systematic monsoon variations parallel to the variations of the spots on the sun. But these changes are barely appreciable, and further investigation may modify his results.

MONS SA'CER (Lat., sacred mount). A hill near Rome, made famous by the secession thither of the Plebs in 494 B.C. It is conjecturally identified with an eminence near the Ponte Nomentano, about 3 miles from the Porta Pia, at the modern Torre di Specchia. Consult Friedrich Lübker, *Reallexikon des klassischen Altertums* (8th ed., Leipzig, 1914).

MONSONI, mŏn-sō'nē, **MONSO'NEE**, or **MOOSE INDIANS.** A division of the Cree (q.v.).

MON'STER. See MONSTROSITY.

MON'STRANCE (OF. *monstrance*, from ML. *monstrantia*, monstrance, from Lat. *monstrare*, to show, from *monstrum*, portent, monster, from *monere*, to warn, admonish), or OSTENSORY. The sacred utensil employed in the Roman Catholic church for the purpose of presenting

the consecrated Host for the adoration of the people, as well while it is carried in procession as when it is exposed upon the altar on occasions of special solemnity and prayer. The use of the monstrance probably dates from the establishment of the festival of Corpus Christi in the thirteenth century. It consists of two parts, the foot or stand upon which it rests and the repository or case in which the Host is exhibited. The latter contains a small semicircular holder called the *lunula*, or crescent, in which the Host is fixed.

MONSTRELET, môn'stre-lâ', ENGUERRAND DE (1390–1453). A French chronicler, probably born in Picardy. Of his life practically nothing is known. According to his own testimony, he was present at the interview between Jeanne d'Arc and the Duke of Bourgogne. In 1430 he had a civil and military office in Compiègne; later he was provost at Cambrai and bailiff at Walincourt. His *Chronique*, which covers the years 1400–44 and continues the narratives of Froissart, is a clear and exact narrative of the time, written with little charm of style. The latest edition is that of Douët d'Arcq (1857–62). There is an English translation by Thomas Johnes (1810).

MONSTROS'ITY (Lat. *monstrositas*, from *monstrosus*, *monstruosus*, monstrous, from *monstrum*, monster, portent), IN ANATOMY. All departures from the normal development of the human fœtus or of the young of the higher animals are now considered under the subject of teratology. These deviations from the normal may vary from the comparatively slight and common anomalies (such as harelip and supernumerary digits) to forms which are so strange and hideous that they merit beyond question the name of monsters. Although the system of Saint-Hilaire is by no means perfect and is not based on embryonic laws, yet it has the advantage of a familiar nomenclature and groups together forms which present similar external characteristics. His classification, somewhat modified by Hirst and Piersol, is the one generally accepted. Under his classification we have four general groups: *Hemiterata*, *Heterotaxics*, *Hermaphrodites*, *Monsters*.

Hemiterata. In this group are included all forms of anomalies which show unusual development, but which are not exaggerated enough to be regarded as monsters nor specific enough to be considered members of the second or third class.

This group is subdivided into:

1. *Anomalies of volume*, with general diminution or increase, as in dwarfs and giants. This abnormal development may affect only a part of the body, as the extremities, or the breasts, or the muscular system.

2. *Anomalies of form*, resulting in deformities of the head, of the stomach, or of the pelvis.

3. *Anomalies of color*, presenting the interesting condition of albinism or abnormal melanism.

4. *Anomalies of structure*, as represented by the persistent cartilaginous condition of bones or the ossification of parts that normally should consist of cartilage.

5. *Anomalies of disposition* include hernia, clubfoot, extrophy of the bladder, and curvature of the spine.

6. *Anomalies of connection* are especially varied. Bones have unusual articulations; muscles have abnormal attachments; and arteries and veins give off branches in violation of anatomical regularity.

7. *Anomalies of continuity* show an imperforate condition of vagina, rectum, or œsophagus, or a union of the kidneys, of the digits, or of the teeth.

8. *Anomalies of closure and disjunction* are illustrated by a vaginal septum and by cleft palate and harelip.

9. *Anomalies of number* embrace many varieties represented by an increase or decrease in the number of digits, teeth, breasts, or other parts.

Heterotaxics include those forms which show transposition of the internal viscera, either of the thorax or of the abdomen. Rarely we find only a single organ transposed; often all are in an abnormal position; but this change is accompanied by no interference of nutrition or of function. So at times the heart will be found on the right side or the liver on the left, and yet the individual is unconscious of any irregularity.

Hermaphrodites. Ahlfeld defines a true hermaphrodite as an individual possessing functionally active glands of both sexes, with excreting ducts and external genitals, so that the offices of both sexes can be fulfilled. Indisputable evidence of such a case has not been adduced, although there are numerous instances where glands presenting the histological characteristics of both sexes have been present in one person. False hermaphrodites present typical glands of one sex and others of a more or less mixed or modified type. They are usually masculine in sex. There are all degrees of abnormality in development, from a slight enlargement of the vesicula prostatica (the masculine uterus of Weber), without any alteration in the external genitals, to a fully developed uterus with tubes and vagina complete in a male subject. The penis in these cases is rudimentary, and a condition of hypospadias (a malformation of the penis, in which the orifice of the urethra is underneath or behind the glans) exists. The scrotum is ill developed, and the testicles remain in the abdomen. The absence of ovaries is not detected, so that the mistake in sex may naturally persist until a post-mortem examination reveals their absence and the true sexual nature of the individual is apparent.

Monsters. In this class we will first consider autositic single monsters which are capable of independent existence in the womb and are the result of an arrest in development, of fusion, or of displacement of important parts. 1. *Ectromelus.*—This group includes aborted or imperfectly formed extremities which present various degrees of shortening or else are entirely absent. Some cases show rudimentary limbs, but perfectly formed hands and feet which appear to come immediately from the trunk. 2. *Symmelus.*—The pelvis and lower extremities in the individuals of this group are imperfectly developed, and the two lower limbs are more or less fused. Sometimes this fusion is complete and the feet are wholly lacking. 3. *Celostoma.*—The individuals in this class show a varying degree of cleft in the walls of the abdomen or of the thorax and consequent eventration. Anomalies of the intestinal tracts and of the urinary and genital apparatus are frequent accompaniments. Malformations of the head are classified under the next three groups:

(4) exencephalus, (5) pseudencephalus, and (6) anencephalus. In group (4) a malformed brain exists, situated in part at least within a cranial cavity of which the walls are imperfect. In group (5) the cranium is even more rudimentary and the brain tissue is but poorly represented, while in the anencephalus the true nerve elements are wholly lacking in the mass of tissue lying within the shallow and imperfect cranial cavity. These brainless monsters are almost always feminine. In (7), the cyclocephali, the eyes approach the mid-line and more or less closely unite. These organs are poorly developed or rudimentary, and the nose is atrophied, although in certain instances a hypertrophied proboscis may arise from above the fused sockets. The lower jaw is poorly developed or wanting in (8), the octocephalic, and the ears approach each other and frequently become fused below. The mouth is, of course, distorted to an exceptional degree.

Omphalositic single monsters are embryos dependent on other embryos within the womb for their own imperfect development. The primary fœtus is usually well formed and supplies both itself and the parasite with blood by means of an extensive anastomosis of placental and umbilical vessels.

When the heart is present in omphalosites it is incomplete. The circulation is sluggish and an overgrowth of connective tissue results, with the formation of lacunæ and cysts and frequently marked œdema. The highest development of these monsters is reached in the paracephalus. In this anomaly the extremities are more or less definitely present, the head has an imperfect cranium and imperfect face, the cervical vertebræ are rudimentary, the diaphragm is defective, and the lungs are absent or else incomplete. There is, of course, no sign of life in these forms after birth.

Composite Monsters embrace all forms in which there is a reduplication of the principal parts of the body. There may be two distinct faces and heads closely fused together, or the duplicity may be only slightly suggested (diprosopus). In other cases (dicephalus) the heads may be quite distinct, and even the upper parts of the body are double, with three or four arms present. The internal organs are duplicated according to the amount of division. Although specimens of this group are seldom born alive, and still more rarely live, yet we have a well-marked instance of this class recorded in the case of the Tocci brothers (1877), who grew up and thrived for many years. In the third class (ischiopagus) two separate distinct bodies are present which are joined by the coccygeal and sacral bones. Only one case is recorded which lived beyond the third year. The pyopagi are very rare. In these, two separate bodies are so joined together in the sacral region that the two individuals stand back to back. The dipygi are cases which show a reduplication of the pelvis, of the genitals, and of the extremities. If four legs are present, they are not all equally well developed, but the two inner legs are much smaller. This division of the body from below may be carried still further (syncephalus), and if the union is simply confined to the heads, these specimens are included in the craniopagi.

In some instances the reduplication is almost complete and the union is comparatively slight, occurring at some point between the umbilicus and the lower thorax. The most famous case is that of the Siamese twins, who lived to be 63 years old. In February, 1902, the Hindu twins Rodica and Doodica, who had been joined in a fashion similar to the Siamese twins, were divided by operation in Paris, France. Rodica survived, but her sister died of tuberculosis.

Double Parasitic Monsters. In this class a more or less perfectly formed body is attached to a well-formed individual, but it has no separate existence, receiving its nourishment wholly from the other.

Triple Monsters are rare, and we know of but one case of a three-headed child—that recorded by Saint-Hilaire, born in 1832 in Catania. Consult: Saint-Hilaire, *Histoire des anomalies de l'organisation* (Paris, 1832–36); Hirst and Piersol, *Human Monstrosities* (Philadelphia, 1892); also Gould and Pyle, *Anomalies and Curiosities of Medicine* (ib., 1897). See DEFORMITIES.

MONSTROSITY. A botanical term applied to a peculiar or unusual form of an organ or of the whole body; better designated by the term "malformation" (q.v.).

MONT, MENT, or **MENTU.** An Egyptian deity, originally the local god of Hermonthis (q.v.), where he had an ancient temple. His chief characteristics were strength and valor, and "strong as Mont" and "brave as Mont" were favorite epithets of the Egyptian kings. Under the New Empire Mont became the national god of war, who fought for the armies of Egypt and gave might and victory to the King. In inscriptions of this period he is styled "Lord of Thebes, dwelling in Hermonthis." In the later theological system he was identified with the sun god under the name of Mont-Rê. With the decline of Thebes and the rise of Hermonthis to supremacy over the surrounding district, Mont gained correspondingly in importance and usurped in some measure the devotion formerly paid to Amon. Magnificent temples were dedicated to him at Karnak and at Medamut, near Thebes, by the Pharaohs of the eighteenth dynasty; and at Tud, the ancient Tuphium, are the remains of a small temple of the god built in Ptolemaic times. Mont is usually represented as a hawk-headed deity wearing upon his head the solar disk and two tall plumes. At his ancient seat of worship, Hermonthis, his sacred animal was the bull Bakh, called Bacis by the Greeks. Consult Wiedemann, *Religion of the Ancient Egyptians* (New York, 1897), and E. A. T. Wallis Budge, *The Gods of the Egyptians* (London, 1904).

MONT, KAREL MARIE POLYDOOR DE. See POL DE MONT.

MONTAGNA, môn-tä'nyȧ, BARTOLOMMEO (c.1450–1523). An Italian painter of the Renaissance, founder of the school of Vicenza. He was born at Orzinuovi, near Brescia, and was influenced in his art by the Vivarini, the Bellini, and especially by Andrea Mantegna. He was active chiefly at Vicenza, and later was employed in Bassano, Verona, and Padua. His works are severe in design and ample in color after the manner of the earlier Venetians. They include the partly destroyed frescoes illustrating the life of St. Blasius, in the church of San Nazaro at Verona; a fine "Pietà" at Monte Berico, near Vicenza; "Madonna with Saints," Johnson collection, Philadelphia; "Madonna and Child" and "A Lady of Rank as Santa Bibiana," Metropolitan Museum, New York; and an altarpiece in the Brera, Milan. Others are in the

Venice Academy, the National Gallery, London, the Louvre, the Berlin Gallery, and, especially, in the gallery and churches of Vicenza.

MONTAGNAIS, môn'tȧ'nyȧ' (Fr., mountaineers). A name applied to a group of closely cognate Algonquian tribes in Quebec Province and Labrador, Canada, extending along the northern shore of the St. Lawrence River from near the entrance of the St. Maurice nearly to the Gulf and inland to the main divide. They have greatly decreased in number from sickness and starvation resulting from the destruction of their former game supply. No separate census is kept, as they are officially grouped with the Nascapi, Têtes-de-Boule, and other tribes and bands. So far as can be learned from the reports, they appear to make their principal living by hunting, fishing, making bark canoes, snowshoes, and moccasins, and acting as guides to tourists. Consult Chamberlain in Geological Survey of Canada, *Annual Archæological Report* (Ontario, 1905).

MONTAGNANA, môn'tȧ-nyä'nȧ. A town in the Province of Padua, Italy, 22 miles southwest of Padua. It is surrounded by walls and towers and has a Gothic cathedral and a sixteenth-century town hall with paintings. Its chief trade is in spun silk, wool, hemp, flax, and coarse cotton textures. It manufactures leather. Pop. (commune), 1901, 10,364; 1911, 11,176.

MONTAGNARDS, môn'tȧ'nyär' (Fr., mountaineers). The name first applied in France in 1790 to the more radical members of the National Assembly, who occupied the high seats in the rear of the amphitheatre where the Assembly met. In the Convention (q.v.) it was applied to the entire Radical Left, composed of Jacobins (q.v.) and Cordeliers (q.v.), in distinction from the more moderate Girondists (q.v.), who occupied the lower seats in the hall. The history of the Convention till June, 1793, is almost entirely the history of the struggle between the Gironde and the Mountain. The former, comprising the philosophers, statesmen, orators, scientists, and men of letters in the Convention, were republicans and liberals of the idealistic type, middle class in their sympathies and out of touch with the more revolutionary aspirations of the masses, while the Mountain was composed to a large extent of the uncompromising leaders of the Parisian groups. The Montagnards themselves, however, were filled with the vague radicalism of the philosophers of the Enlightenment, were unable to construct or unite upon any definite practical program of social amelioration, and gave way before the Thermidorian reaction. Upon the question of Louis XVI's fate, the issue between the two parties was practically fought out. Then, as in the crisis brought on by foreign invasion and internal disorder, the Girondists showed themselves irresolute. The Montagnards in condemning the King challenged all Europe, took the guidance of the Revolution into their own hands, and some time after (June 2, 1793) destroyed all opposition by arresting the leaders of the Gironde and sending them to the guillotine. The subsequent acts of the Convention were the acts of the Montagnards, under their leaders Danton, Marat, Robespierre, and Collot d'Herbois. In 1848 the Radicals under Louis Blanc and Ledru Rollin called themselves Montagnards. Consult: Jules Claretie, *Les derniers Montagnards* (Paris, 1874); Shailer Mathews, *French Revolution* (New York, 1901); Lichtenberger, *Le socialisme dans la révolution française* (Paris, 1901); also *Cambridge Modern History*, vol. viii, p. 807 (New York, 1904), for a bibliography. See Danton; French Revolution; Marat; Robespierre; Saint-Just.

MONTAGU, mŭn'tȧ-gū *or* mŏn'-, Basil (1770–1851). A British lawyer and author, natural son of John Montagu, fourth Earl of Sandwich. He was educated at the Charterhouse and at Christ's College, Cambridge, where he graduated M.A. in 1793. In 1795 he went to London, where he studied for the bar, to which he was admitted three years later, and soon afterward he began to publish works dealing with legal subjects. He interested himself particularly in relieving the conditions of the debtor class and succeeded in securing the abolition of the death penalty for certain crimes. Among his writings are: *An Enquiry Respecting the Expediency of Limiting the Creditor's Power to Refuse a Bankrupt's Certificate* (1809); *The Opinions of Different Authors upon the Punishment of Death* (1809); *An Enquiry Respecting the Mode of Issuing Commissions in Bankruptcy* (1810); *Enquiries Respecting the Insolvent Debtors' Bill, with the Opinions of Dr. Paley, Mr. Burke, and Dr. Johnson upon Imprisonment for Debt* (1816); *The Law and Practice in Bankruptcy as Altered by the New Statutes, Orders, and Decisions*, with Scrope Ayrton (2 vols., 1837; 2d ed., 1844). His edition of Bacon's works occasioned Macaulay's well-known essay in the *Edinburgh Review* (1837).

MONTAGU, Charles, first Earl of Halifax. An English poet and statesman. See Halifax, Charles Montagu, Earl of.

MONTAGU, Edward, first Earl of Sandwich. See Sandwich.

MONTAGU, Elizabeth (Robinson) (1720–1800). An English writer and society leader, born at York. In 1742 she married Edward Montagu, grandson of the first Earl of Sandwich, who on his death left her a large fortune. With abundance of wealth and possessing literary talent, she became a leader in London society, and numbered among her regular visitors Lord Lyttleton, Horace Walpole, Dr. Johnson, Burke, Garrick, and Sir Joshua Reynolds. The epithet of "bluestocking" was first applied to her gatherings. In 1760 she wrote three *Dialogues of the Dead*, published in Lord Lyttleton's work by that name, and in 1769 an *Essay on the Writings and Genius of Shakespeare, Compared with the Greek and French Dramatic Poets*, that received high praise from her contemporaries. Her correspondence in great part was published in 1809–13. Consult: Doran, *A Lady of the Last Century* (London, 1873); *Elizabeth Montagu, the Queen of the Bluestockings: Her Correspondence from 1720 to 1761* (2 vols., New York, 1906); René Huchon, *Mrs. Montagu and her Friends* (ib., 1907).

MONTAGU, John, fourth Earl of Sandwich. See Sandwich.

MONTAGU, Lady Mary Wortley (1689–1762). An English poet and letter writer, eldest daughter of Evelyn Pierrepont (afterward Duke of Kingston). She was baptized in London, May 26, 1689. From her brother's tutor or by herself she learned Latin, and read widely in English drama and romance. When a mere girl she was toasted by her father at the Kit-Cat Club, and on her appearing there was ad-

mitted a member by acclamation. Without the approval of her family she privately married (Aug. 12, 1712) Edward Wortley Montagu, a Whig member of Parliament, with whom she lived for a time in retirement. On the accession of George I she went to London with her husband. There her beauty and wit attracted unusual attention at court, and she was much admired by the wits, especially by Pope. In 1716 appeared surreptitiously her *Court Poems*, afterward called *Town Eclogues*. The same year she set out with her husband on his embassy to Constantinople. At Adrianople she became interested in inoculation for smallpox (1717) and on her return introduced the practice into England. During her travels in the East she wrote her well-known *Letters* (posthumously published), delightful in themselves and valuable for the light they throw upon the manners and customs of the time. Returning to England (1718), the Montagus soon settled near Pope at Twickenham, and Lady Mary became one of the best-known women in London society. Pope had addressed verses to her and had kept up a correspondence during her absence. The friendship was now renewed on more intimate terms, but by 1722 they quarreled. Pope seems to have made a declaration of love, which was met with a burst of laughter. Pope afterward satirized her as Sappho in various poems. Swift lampooned her in *The Capon's Tale* (1726). In the *Epilogue to the Satires* (1738) she is accused by Pope of starving a sister and forswearing a debt, and in the *Imitations of Horace* (1733) a worse charge is brought against her (first satire, 2d book, i, 84). For unknown cause she left her husband in 1739 and lived abroad for many years, chiefly in Italy. Her husband died in 1761, and the next year she returned to England, at the request of her daughter, Lady Bute. She died Aug. 21, 1762. Consult her *Works*, edited by her great-grandson, Lord Wharncliffe (London, 1837; new eds., 1887, 1893), and E. M. Symonds, *Lady M. W. Montagu and her Times* (New York, 1907). See INOCULATION.

MONTAGU, RALPH, first DUKE OF (c.1638–1709). An English diplomat. In 1665 he became master of horse to Queen Catharine and in 1669–72 and 1676–78 was Ambassador to Louis XV of France. He was married to Elizabeth Wriothesley (died 1690), the wealthy widow of the Earl of Northumberland, in 1673; succeeded his brother as Baron Montagu in 1684; and throughout all this period he was continuously active in various court intrigues. Although he enjoyed the favor of James II, he was one of the first to take the oath to William and Mary, and he was rewarded by being made Viscount Monthermer and Earl of Montagu in 1689. In 1692 he increased his favor at court by marriage to the insane but very rich Elizabeth Cavendish, widow of the Duke of Albemarle, and in 1705 he was elevated to be Marquis of Monthermer and Duke of Montagu.

MONTAGUE, mŏn'tȧ-gū. A town, including several villages, Turners Falls being industrially the most important, in Franklin Co., Mass., separated from Greenfield by the Connecticut River, and on the Boston and Maine, the New York, New Haven, and Hartford, and the Central Vermont railroads (Map: Massachusetts, B 2). It has three public libraries, the Farren Hospital, and extensive manufactures of cotton goods, paper, pulp, cutlery, hardware, water wheels and pumps, toilet articles, bricks, silk, and fishing rods. The government is administered by town meetings. The water works are the property of the municipality. There is a large power plant at Turners Falls which furnishes current to towns at considerable distances away. Montague was settled about 1716 and was incorporated as a district in 1753. Pop., 1900, 6150; 1910, 6866.

MONTAGUE, FRANCIS CHARLES (1858–). An English historian, born in London. He was educated at University College, London, and at Balliol, Oxford; was fellow of Oriel College, Oxford; and in 1884 was called to the bar. In 1893 he became Astor professor of European history at University College, London, and from 1900 on was curator of the Indian Institute at Oxford. He wrote *Limits of Individual Liberty* (1885), *Technical Education* (1887), a *Life of Sir Robert Peel* (1888), and *Elements of English Constitutional History* (1894); contributed to the *Cambridge Modern History* (vol. viii, 1904) and Longmans' *Political History of England* (vol. vii, James I to Restoration, 1907); and edited Bentham's *Fragment on Government* (1891) and Macaulay's *Essays* (1903).

MONTAGUE HOUSE. 1. A former London mansion built for the first Duke of Montague. It was bought by the government at the time of the purchase of the Sloane collection, which, with the Harleian manuscripts and the Cottonian library, was deposited in it, forming the nucleus of the British Museum. The expansion of the museum in the early part of the nineteenth century made the addition of a wing necessary, and the building was finally replaced by the present British Museum between 1823 and 1852. 2. A building in Whitehall, London, residence of the Duke of Buccleuch, containing a large collection of pictures and miniatures.

MONTAGUES. See CAPULETS AND MONTAGUES.

MONTAIGLON, môn'tȧ'glôn', ANATOLE DE COURDE DE (1824–95). A French bibliographer and paleographer, born in Paris. A student at the Ecole des Chartes, he obtained his diploma as archivist in 1850, and held positions successively at the Museum of the Louvre, the Arsenal Library, and that of Ste. Geneviève, until he became professor of bibliography at the Ecole des Chartes. His numerous works, which deal chiefly with the origin of French art and literature, include: *Mémoires pour servir à l'histoire de l'académie royale de peinture* (1853); *Catalogue raisonné de l'œuvre de Claude Mellan d'Abbeville* (1858); *Notice historique et bibliographique sur Jean Pélerin, dit le Viateur* (1861); *Recueil général et complet des fabliaux des XIIIème et XIVème siècles* (9 vols., 1872–90); *Un voyageur anglais à Lyon sous Henri IV* (1881); *Procès-verbaux de l'Académie royale de peirture et de sculpture* (1888–89, 1892); *Correspondance des directeurs de l'Académie de France à Rome, etc.* (1893–99); *Bibliographie chronologique des ouvrages de Benjamin Filon* (1895); *L'Advocacie Nostre-Dame; Poème normand du XIVe siècle* (1896).

MONTAIGNE, mŏn-tān', *Fr. pron.* môn'-tâ'-ny', MICHEL EYQUEM DE (1533–92). A great French essayist and moralist. Montaigne got his name from the Château Montaigne, near the Dordogne, in Périgord, where he was born Feb. 28, 1533. The family fortune was begun by Michel's great-grandfather, a merchant and

citizen of Bordeaux. The essayist's father turned him over to a nurse, who reared him in a hamlet on his father's estate. As he tells us himself, he was awakened in the morning with music, and his father had him so well drilled in Latin that when he went to the Collège de Guyenne at Bordeaux he astounded every one by his Latinity, though he was but six years old. The boy's mother was Antoinette de Loupes (i.e., Lopez), of a Jewish family, which had come from Spain. To judge by Saint-Aubin's engraving after the original portrait at the Château Montaigne, the essayist had an oval face, a good-sized nose, a wrinkled forehead, high cheek bones, and a smallish chin. He wore a short beard, with a moustache, and his mouth hardly suggests the sweetness of temper so apparent in his essays.

After eight years under the famous André de Govea, master of the Collège de Guyenne, then the best school in France, Montaigne seems to have studied law in Bordeaux and Toulouse till 1554. His essays, however, are scarcely the work of a lawyer, but rather of a genial, ever-inquisitive, and usually whimsical humorist. Sooner or later Montaigne skirted most of the hills of knowledge, rarely exerting himself to climb to their tops, but seeing very clearly from the level. At the Collège de Guyenne he had continued his studies in the language, literature, and history of Rome, and had taken part in the Latin plays written for him and his mates by Buchanan and Muret. This we know from Montaigne's own words; but we also learn from him that he was lazy and careless and that in reading he followed his whims. At 21, as a younger son, he was cared for by being made a member of the Cour des Aides at Périgueux, and three years later he was appointed counselor of Parliament at Bordeaux. Thus he met Etienne de la Boétie (q.v.), and there sprang up between them a friendship that lasted till La Boétie's death in 1563. At 33 Montaigne wedded Françoise de la Chassaigne, yielding to convention, for he declares he "would not have married Wisdom herself" for his own pleasure. He tells us that he lost "two or three" children in babyhood, but a daughter survived him. Montaigne had done his first literary work in 1568 by translating the *Theologia Naturalis* of Raimond Sebond, a Spaniard who had been a professor at Toulouse in the fifteenth century. This book was the text for Montaigne's most famous essay in skepticism, the *Apologie de Raimond Sebond*. In 1570 Montaigne edited the literary remains of La Boétie. After this he seldom left his estate, except for visits to Paris and an 18 months' visit to Germany, Switzerland, and Italy in 1580. Of this voyage he left an interesting diary, partly in French and partly in Italian, first published in 1774, and edited by A. d' Ancona (Città di Castello, 1889). He was elected (1581) and reëlected mayor of Bordeaux. His last years were brightened by the Platonic affection of an adopted daughter, Mademoiselle de Gournay, a Parisian, who at 19 had been attracted by his essays, of which she later prepared a valuable edition (1597). Montaigne suffered much towards the close of his life from gravel and stone. In 1592 he died of quinsy, receiving devoutly the last offices of the Church, though his mottoes *Que sais-je?* (What do I know?) and *Qu'importe?* (What matters it?) are those of an easy-going skeptic.

The essays, of which the first were written in 1572, beginning in self-analysis, finally came to take for their field the knowledge of man in general. Wholly unsystematic though they are, they show an insatiable curiosity, which seeks rather its own stimulation than the satisfaction of a definite conclusion. Montaigne drew the material for his reflections not so much from his own surroundings as from Seneca, Lucretius, and the historians, from Plutarch, Xenophon, and the anthology of Stobæus, and from the biographies of Diogenes Laërtius, as well as from Italian letter writers and historians. Behind their thoughts he often sheltered his own, preferring rather to suggest that others had doubted than that he himself was other than a royalist and a Catholic. Suspended judgment, contented detachment, and a practical epicureanism are the teachings of Montaigne, who observes that "men are tormented by what they think about things, not by the things themselves." "However specious novelty may be," says he, "I change not easily, for I fear to lose by the change. . . . So I have, by God's grace, kept without worry and turmoil of conscience the old beliefs of our religion through all the sects and divisions that our century has brought forth." His attitude was not heroic, but it proved contagious; for the anti-Christian or simply non-Christian current which can be noted in the seventeenth century, passing through Molière or through Descartes and finally reaching Voltaire, seems to have its source in Montaigne. Rationalism, Epicurean or Cartesian, is already by implication in the essays. In his own day Montaigne stood almost alone among men who were hasty in thought and quick to act. Few French works have exercised so great and lasting an influence on the writing and thought of the world as the essays of Montaigne. He stands alone and secure among the world's writers. Through Florio (q.v.), who published his admirable translation in 1603, Montaigne was known to Shakespeare, and he very slightly influenced Francis Bacon, 10 of whose essays appeared in 1597. He has fascinated great men in every civilized country and in every generation—never, perhaps, more than now.

Editions of the essays appeared in 1580, 1582, and 1588, each containing changes as well as new material. In 1595 his family, aided by Mademoiselle de Gournay and Pierre de Brach, published what they called "a new edition found after the author's death and augmented by him by a third more than was in preceding impressions." The text of 1595 forms the base of Courbet and Royer's edition (Paris, 1872–91), which has also Montaigne's letters. There is in the municipal library of Bordeaux a copy of the edition of 1588, with many autograph notes by Montaigne, differing, often considerably, from the changes in the editions of 1595. These notes were used in the not very accurate editions of Naigeon (Paris, 1802), of Desoer de l'Aulnaye (ib., 1818), and of Amaury-Duval (ib., 1820). Convenient for general use are the edition of Leclerc (ib., 1865) and, in English, that of the second William Hazlitt (4 vols., Boston, 1887). Fortunat Strowski edited *Les essais de Michel de Montaigne* (2 vols., Bordeaux, 1906–09). The essays had been translated into English by John Florio (1603) in time to be used by Shakespeare and, as it seems, by Ben Jonson also. Florio's rendering was reëdited by C. Cotton (3 vols., London, 1711),

Percival Chubb (ib., 1891), W. C. Hazlitt (with *Letters*, 4 vols., 1902), Adolphe Cohn (New York, 1907), Thomas Seccombe (London, 1908).

Bibliography. Grün, *La vie publique de Montaigne* (Paris, 1855); Malvezin, *M. de Montaigne: Son origine, sa famille* (ib., 1875); Bonnefon, *Montaigne, l'homme et l'œuvre* (ib., 1893), reprinted in the same author's *Les amis de Montaigne* (ib., 1898); Stapfer, *Montaigne* (ib., 1894); id., *La famille et les amis de Montaigne* (ib., 1896); also Nerlet, *Etudes littéraires* (ib., 1882); Champion, *Introduction aux essais de Montaigne* (ib., 1899); V. Giraud, *Les époques de la pensée de Montaigne* (ib., 1909); Villey, *L'Influence de Montaigne sur Locke et Rousseau* (ib., 1911). Works in English are the *Lives* of Montaigne by St. John (London, 1858) and M. E. Lowndes (ib., 1898); R. W. Emerson, "Montaigne," in *Representative Men* (Boston, 1850); Pattison, in *Essays* (ib., 1889); H. D. Sedgwick, *Essays on Great Writers* (ib., 1903); E. Dowden, *Michel de Montaigne* (Philadelphia, 1905); G. E. Woodberry, *Great Writers* (Garden City, N. Y., 1907); Grace Norton, *The Influence of Montaigne* (Boston, 1908); id., *The Spirit of Montaigne* (ib., 1908); J. M. Robertson, *Montaigne and Shakespeare* (New York, 1909); Edith Sichel, *Michel de Montaigne* (ib., 1911). A specially luminous treatment of the man and his attitude towards life is in Walter Pater, *Gaston de Latour* (London, 1896). There is a good bibliography appended to Bonnefon, "Montaigne," in Petit de Julleville, *Histoire de la langue et de la littérature française*, vol. iii (Paris, 1897).

MONTALEMBERT, môn'tȧ'läN'bâr', Charles Forbes de Tyron, Count (1810–70). A French historian and publicist. He was born in London, May 29, 1810, of an ancient noble family, his father, who had been driven out by the Revolution, having entered the English service. His mother was of the Scottish family of Forbes, to which circumstance may be ascribed Montalembert's knowledge of, and strong admiration for, English social and political institutions. He began his studies at Fulham, near London, and finally, after some time spent in Stockholm with his father, who was Ambassador to Sweden, completed them in Paris. At 20, already an ardent champion of Catholicism and of popular freedom, which he hoped to see united, he joined Lamennais (q.v.) on the staff of the *Avenir* and coöperated with him in the establishment of free schools. He accompanied Lamennais on his unhappy journey to Rome, and then to Munich, and remained in close sympathy with his views, even after his master had gone further away from orthodoxy in *Paroles d'un croyant* (1834). At the end of that year, however, he broke with Lamennais and definitely submitted to the papal decisions. He still maintained his ardent desire to demonstrate the close relations of his faith and popular liberty, and took great delight in the study of mediæval history, the first fruit of which was his *Histoire de Sainte Elisabeth d'Hongrie* (1836). Three years later appeared a collection of his studies in mediæval art, which he vigorously exalted over corrupt modern standards under the title *Du vandalisme et du catholicisme*. In 1835, having now attained the required age, he took his seat in the House of Peers, where, young as he was, he stood out at once as a champion of religion. After the revolution of 1848 he was elected a member of the Constituent Assembly, and took his seat on the Right, though acting occasionally with the Left. He had a decisive influence in bringing about French intervention in Italy and the restoration of Pius IX to Rome. He was elected to the Legislative Assembly also, and for a time contrived, while he continued the same line of policy as regarded Church interests, to give a general support to the government of Louis Napoleon. His first break with that government was on the question of the proposed confiscation of the Orléans property, and after the coup d'état of Dec. 2, 1851, the breach became irreconcilable. From that time he continued to be the implacable assailant of the arbitrary repression of public opinion which characterized the measures of Napoleon III. Failing of reëlection in 1857, he devoted himself to literature, in which his eminence had been recognized by election to the Academy in 1851. In a political prosecution in 1858 he was ably defended by Berryer (q.v.). A devoted son of the Church, he clung to his early passion for freedom of thought, and took a pronounced position in favor of the view that the papal syllabus of 1864 and the declaration of infallibility were both inopportune. He died March 13, 1870. Besides a large number of articles, he left many books of great interest, of which the following have been translated into English: *Catholic Interests in the Nineteenth Century* (1852); *The Political Future of England* (1856); *Constitutional Liberty* (1858); *Pius IX and France in 1849 and 1859* (1861); *Pius IX and Lord Palmerston* (1863); *Memoir of the Abbé Lacordaire* (1863). Of these and other works a collected edition in French appeared in eight volumes (Paris, 1860–68). But to English readers he is best known by his brilliant series of historical studies, *Les moines d'occident* (5th ed., 1847–77), translated as *The Monks of the West, from St. Benedict to St. Bernard* (new ed. by Gasquet, London, 1895). Consult his *Life* by Mrs. Oliphant (London, 1872) and by De Meaux (Paris, 1897); also Lecanuet, *Montalembert d'après ses papiers et sa correspondance* (3 vols., ib., 1895–1905); Follioley, *Montalambert et Monseigneur Parisis* (Paris, 1906); Paul Thureau-Dangin, *English Catholic Revival in the Nineteenth Century* (2 vols., London, 1914).

MONTALEMBERT, Marc René, Marquis de (1714–1800). A French general. He was born at Angoulême, entered the army at 18, and served in Germany (1733) and in Italy and Bohemia (1742). He wrote much on fortification after his election to the Academy of Sciences (1747), and, in spite of opposition to his novel theories, was intrusted with the fortification of the island of Aix in 1779. He recognized the defects of the bastion system (Vauban, q.v.) of defense in fortifications, and advocated the employment of casemates for protected gunfire. His theories were first adopted by Prussia, and formed the basis of what afterward became known as the polygonal system of defense. He is also famous for his work, *La fortification perpendiculaire* (1776–86), reëdited under the title *L'Art défensif supérieur à l'offensif* (1793). See Fortification.

MONTALVÁN, mōn'tȧl-vän', Juan Pérez de (1602–38). A Spanish dramatist and novelist. With the degree of doctor of theology, he joined the priestly congregation of St. Peter at Madrid. Already a successful dramatist at 17, he passed under the influence of Lope de Vega, who urged him to the composition of his *Orfeo en lengua*

castellana (1624), a work produced in competition with Jáuregui's *Orfeo*. In the same year he produced some eight tales, *Sucesos y prodigios de amor*, which were translated into French and published at Paris as early as 1644. A prose work, the *Vida y purgatorio de San Patricio* (1627), deals with the familiar legend of St. Patrick's Purgatory, and afforded the material whence Calderón was to derive his play on the subject. A collection containing tales and other compositions more or less dramatic in form is the *Para todos* (1632). It is as a playwright that Montalván stands highest, ranking as one of the more important of the dramatists next in consequence to Lope, Calderón, Alarcón, Tirso de Molina, and Moreto. He himself prepared two editions of his pieces, published in 1638 and 1639 and reprinted in 1652. The favorite among the dramas is the *Amantes de Teruel*. Selected plays of Montalván may be found in vol. xlv of the *Biblioteca de autores españoles*. Consult G. W. Bacon, "The Life and Dramatic Works of Dr. J. P. de Montalván," in the *Revue Hispanique*, vol. xxvi (Paris, 1912), and James Fitzmaurice-Kelly, *Bibliographie de l'histoire de la littérature espagnole* (ib., 1913).

MONTALVO, García Ordóñez de. See Ordóñez de Montalvo, García.

MONTANA, mŏn-tă'nȧ (Lat., mountainous). A northwestern State of the American Union, lying between lat. 44° 26′ and 49° N. (the international boundary) and long. 104° and 116° W. It is bounded on the north by the Canadian provinces of British Columbia, Alberta, and Saskatchewan, on the east by the Dakotas, on the south by Wyoming and Idaho, and on the west by Idaho. Montana ranks third in size among the States of the Union. Its greatest length from east to west is along the forty-eighth parallel, 540 miles; and its average width from north to south is 275 miles. Its area is 146,997 square miles, of which 796 square miles are water. Glacier National Park, in northwestern Montana, has an area of 915,000 acres, 80 glaciers ranging from 5 square miles down to a few acres, and over 250 lakes. By means of good trails some of the best alpine scenery of the United States has been made available to thousands of tourists.

Topography. The eastern three-fifths of the State consist of rolling plains, lying at an elevation of from 2800 feet in the northeast to about 4000 to 5000 feet among the foothills of the Rocky Mountains, which take up the western portion. The main continental divide runs from Yellowstone Park for some distance along the southwest boundary, after which it turns eastward, and then crosses the State obliquely in a northwest direction. The general elevation of its crest is about 6500 feet, and the peaks rise from 8000 to 12,834 feet, Granite Peak representing the highest elevation. Thus, the range is considerably lower here and also less rugged than farther south in Wyoming and Colorado. A great longitudinal basin separates the Main Divide from the Bitter Root Mountains, which form the west boundary, and whose crest lies throughout between 7000 and 8000 feet above the sea. The mountain region is diversified by numerous spurs, valleys, and outlying ranges. It has been estimated that there are 30,000,000 acres of land level enough to be farmed, but much of it can be used only for dry farming.

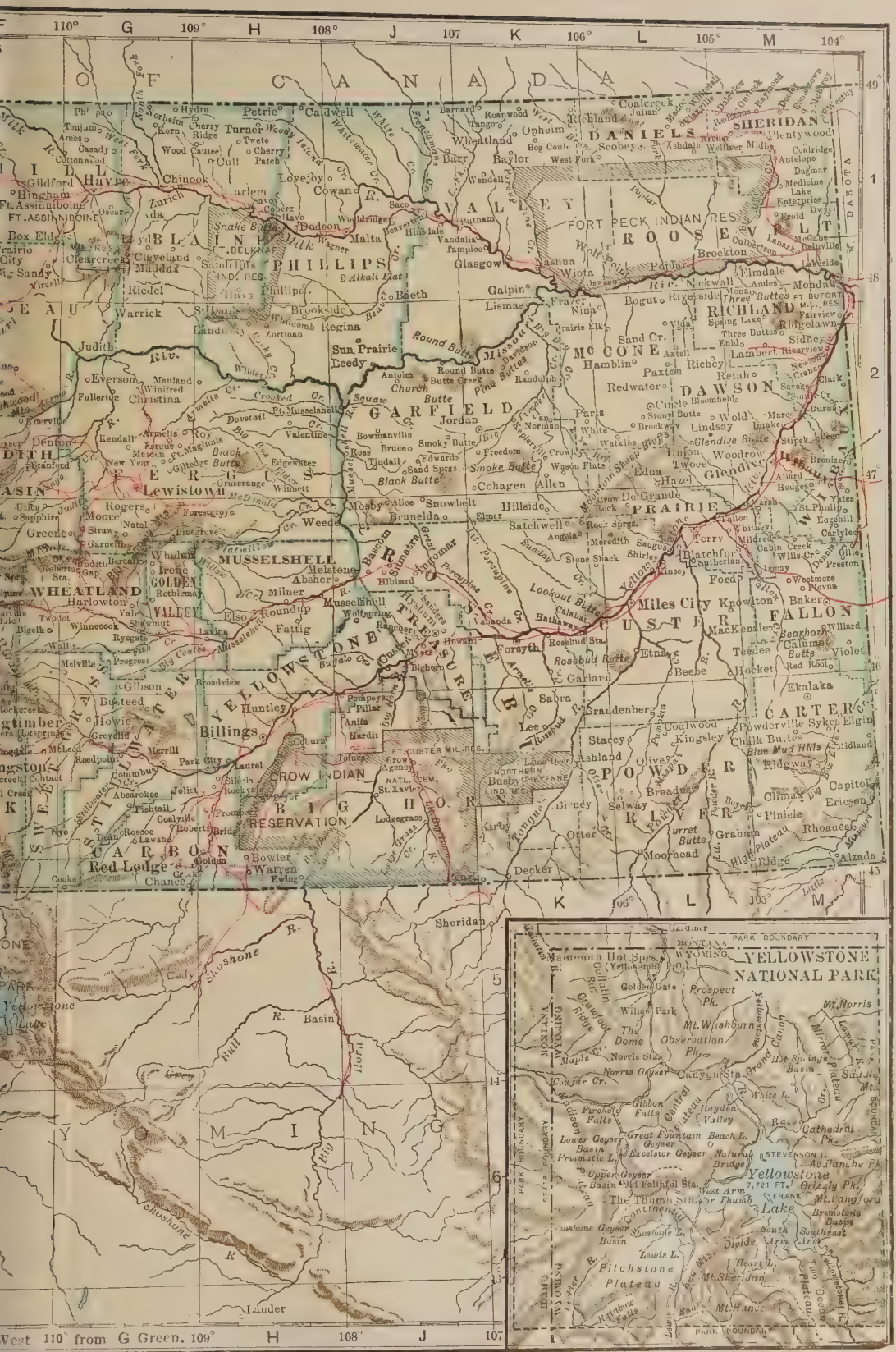
Hydrography. The Main Divide separates the Missouri system from the Columbia River system, these two receiving the drainage of the State. The Missouri River springs from three main head streams in the extreme southwestern portion and in Yellowstone Park. It flows first northward along the eastern base of the mountains, then eastward through the great plains to the east boundary, just beyond which it receives its first large tributary, the Yellowstone, which drains the southeastern quarter. The Clark Fork of the Columbia River, with its two main branches, the Missoula and the Flathead, drains the great western basin, the latter branch flowing through Flathead Lake, the only lake of considerable size, with a length of 26 miles, an average width of 6 miles, an area of 191.8 square miles, at least 300 feet deep, at an elevation of about 2900 feet above the sea, and formed by the damming of the valley by a large Glacial moraine. Congress set aside 160 acres in this lake for a biological station, where the University of Montana conducts teaching and investigation. Both the Missouri and the Yellowstone are navigable for small boats more than 300 miles from the boundary, and the Clark Fork is also navigable for some distance into Montana. The railroads, however, have supplanted the rivers as means of communication.

Climate. The climate is in general very dry, healthful, and exhilarating. There is a great annual range of temperature, extending from 30° to 45° F. below zero to 110° F. above. At some stations the temperature has been more than 60° below zero, while the same locality may have an annual range of over 150°. The average mean temperature for the State ranges from 37° F. in the extreme northeastern part to 47° F. in certain sheltered valleys. The extreme cold winter is often tempered by the warm and dry chinook (q.v.), which blows in a northeasterly direction from the mountain ranges and absorbs a large amount of moisture from the snow it melts. Blizzards occur only in the eastern plains, and tornadoes are unknown. The rainfall is generally insufficient to support agriculture without irrigation. The western mountainous part receives from 15 to 25 inches, east of the mountains from 10 to 15 inches, most of this during the growing season.

Soil and Vegetation. The principal valleys are characterized by fine level meadows with a rich loamy soil and are occupied by extensive cattle ranges. The eastern plains are almost treeless prairies, the river courses alone being fringed with willow, cottonwood, and similar trees. There are extensive forests of conifers in the mountain region of the western half, amounting in 1908 to about 28,000 square miles, or 20 per cent of the State's area. A considerable portion of this, however, has been burned over. The national government has reserved forest areas within the State amounting (1912) to 25,200 square miles. Yellow pine, red fir, Douglas spruce, and tamarack are the principal varieties.

Fauna. Before the advent of the white man the fauna east of the mountains was representative of the great plains in general and characterized by such animals as the jack rabbit, pocket gopher, prairie dog, badger, bison, coyote, sage and short-tailed grouse, and great numbers of grasshoppers. The fauna of the western forested part includes black and grizzly bear, elk, moose, mule and white-tailed deer, marten, beaver, lynx, mountain lion, coyote, wolf, porcu-

MONTANA
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80 90 100
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160
County Towns
Railroads
L. L. POATES ENGR'G CO., N.Y.
Great Falls
Helena
Butte
Missoula
Kalispell
Anaconda
Hamilton
Philipsburg
Dillon
Bozeman
Livingston
Virginia City
Sheridan
Deer Lodge
Boulder
Valkerville
Gunderson
Whitehall
Three Forks
Townsend
Harlowton
Lewistown
Fort Benton
Havre
Chinook
Malta
Glasgow
Wolf Point
Scobey
Plentywood
Sidney
Glendive
Miles City
Forsyth
Hardin
Billings
Laurel
Red Lodge
Columbus
Roundup
Lavina
Ryegate
Big Timber
Reed Point
Absarokee
Fromberg
Belfry
Bridger
Joliet
Park City
Silesia
Edgar
Rockvale
Warren
Alzada
Camp Crook
Bowman
Marmarth
Baker
Ekalaka
Broadus
Powderville
Ismay
Terry
Fallon
Wibaux
Beach
Medicine Lake
Culbertson
Froid
Poplar
Wolf Point
Brockton
Fort Peck
Nashua
Circle
Jordan
Winnett
Grass Range
Moore
Judith Gap
Hobson
Utica
Stanford
Geyser
Raynesford
Belt
Neihart
Monarch
Cascade
Simms
Sun River
Augusta
Choteau
Dupuyer
Valier
Conrad
Shelby
Cut Bank
Browning
Babb
Kevin
Sunburst
Sweetgrass
Coutts
Milk River
Whitlash
Galata
Chester
Joplin
Inverness
Hingham
Rudyard
Big Sandy
Box Elder
Havre
Gildford
Hogeland
Turner
Dodson
Saco
Malta
Glasgow
Nashua
Frazer
Oswego
Vandalia
Opheim
Scobey
Flaxville
Plentywood
Westby
Whitetail
Redstone
Outlook
Culbertson
Froid
Bainville
Medicine Lake
Wolf Point
Brockton
Fort Peck
Poplar


110° G 109° H 108° J 107 K 106° L 105° M 104°
O F C A N A D A
DANIELS
SHERIDAN
VALLEY
FORT PECK INDIAN RES.
ROOSEVELT
PHILLIPS
BLAINE
MILK RIVER
RICHLAND
McCONE
DAWSON
GARFIELD
PRAIRIE
WIBAUX
MUSSELSHELL
GOLDEN VALLEY
WHEATLAND
FERGUS
YELLOWSTONE
CUSTER
FALLON
CARTER
POWDER RIVER
CROW INDIAN RESERVATION
BIG HORN
CARBON
Miles City
Billings
Red Lodge
Lander
Sheridan
YELLOWSTONE NATIONAL PARK
Mammoth Hot Sprs.
Golden Gate
Prospect Pk.
Mt. Norris
Willow Park
Mt. Washburn
The Dome
Observation Pk.
Norris Sta.
Norris Geyser Basin
Canyon Sta.
Grand Canyon
Hot Springs Basin
Cougar Cr.
White L.
Gibbon Falls
Hayden Valley
Cathedral Pk.
Lower Geyser Basin
Great Fountain Geyser
Beach L.
Excelsior Geyser
Natural Bridge
STEVENSON I.
Yellowstone
Grizzly Pk.
Upper Geyser Basin
Old Faithful Sta.
West Arm
7,721 FT.
The Thumb Sta.
Thumb
Lake
Mt. Langford
Continental Divide
Lewis L.
Heart L.
Pitchstone Plateau
Mt. Sheridan
Rainbow Falls
Mt. Hancock
PARK BOUNDARY

pine, rabbit, hare, woodchuck, squirrel, chipmunk, mountain sheep, and mountain goat. The fishes are very few in kind and include trout, grayling, and whitefish. In western Montana, particularly in the Bitter Root valley, part of the ticks (*Dermacentor venustus*) are infected with a germ disease which is communicated to man by the bite of the tick and a disease, known as spotted fever, results which is fatal in a large number of cases.

Geology and Minerals. The eastern and western halves of the State differ widely in their geological structure. The eastern plains consist mainly of undisturbed strata of Cretaceous and Tertiary rocks, the latter forming the extreme eastern portion. Narrow belts of Jurassic and Carboniferous rocks skirt the Cretaceous formation on the west along the base of the mountains. The mountainous half has a complex structure, with much folding and faulting. In the south the Archean granite cores and outpourings of Tertiary lava predominate on the surface, while north of the Missouri the main range is synclinal, the peaks being of Paleozoic formation.

Building materials such as limestone, sandstone, slate, granite, sands, and clay are abundant, and there are large deposits of marble of various hues. Bituminous coal is found along the eastern base of the mountains, and extensive beds of lignite exist in the east along the Missouri and Yellowstone rivers, but only in patches farther west, while petroleum is also found. Copper is very abundant, and lead, iron, and silver ores also exist, the silver generally in conjunction with the copper. Gold has also been found in great quantities in many parts. Around the headwaters of the Missouri and Yellowstone there are numerous hot springs and geysers.

Mining. Montana is an important mineral-producing State, ranking tenth in the value of its products in 1913. In the production of copper it is surpassed only by Arizona, and in the value of the silver produced only by Nevada. The first record of the production of copper was in 1868, but Montana did not become an important contributor of this metal until 1880, since when there has been a steady and rapid increase in the output. Towards the close of 1913 the State had yielded nearly 6,200,000,000 pounds, or more than one-third of the total output for the United States since 1845, ranking first among the States. The entire output is furnished by the Butte district. The presence of copper minerals in this district had been known since the discovery of gold in 1864, and attempts were made to treat the ores as early as 1866. It was not, however, until the late seventies that Butte began to attract attention as a copper camp, and large productions did not begin until a railroad reached the district in 1881. The production of copper in 1913 was 287,828,699 pounds, valued at $44,613,448.

Silver is second in importance and is obtained chiefly as a by-product in the mining of copper. In 1913, out of a total production of 13,819,201 ounces, 10,326,364 fine ounces were from copper and copper-lead ores. The value of the production was $8,346,797. The gold output of Montana from deep mines has been steadily falling off, but the placer output is increasing. The gold output in 1913 was valued at $3,493,432. The lead production in 1913 was 5468 short tons, valued at $481,176. The production of zinc is more important than that of lead, and in 1913 this amounted to 44,337 short tons, valued at $4,965,693. There are still large tonnages of zinc undeveloped, and Montana promises to rival the most important States in the production of this metal.

The coal areas are also important. The coal fields are widely scattered and range in the quality of their output from lignite to a fair grade of bituminous coal. In point of production the most important field is in Carbon County. The production in 1913 was the largest ever made, 3,240,973 short tons, valued at $5,653,539. The number of men employed in the coal mines in 1913 was 3630.

Montana leads in the production of precious stones, this supremacy being due to the mining of sapphire, one of the few instances of gem mining carried on in the United States. The total value of the gems produced in 1913 was $244,935. Other mineral products are cement, clay manufactures, grindstones, gypsum, iron ore, lead, lime, mineral waters, sand and gravel, sand-lime brick, and stone. The total value of the mineral products in 1913 was $69,307,056.

Agriculture. The total number of farms in 1910 was 26,214, representing an aggregate area of 13,545,603 acres, about one-seventh of the entire State. The improved land in farms in 1910 was 3,640,309 acres; the average acres per farm were 516.7; and the total value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, in 1910 was $347,828,770. The average value of all property per farm was $13,269 in 1910, and the average value of land per acre was $16.74.

One striking characteristic of Montana is the great area of semiarid land utilized for grazing purposes only, or left unutilized. Upon this land are located many very large farms or ranches, frequently exceeding 100,000 acres in extent. Of the total number of farms in 1910 (26,214), 23,870 were operated by owners and managers and 2344 by tenants. The great majority of farms have been acquired by their owners or operators from the government or from private corporations in the form of homesteads, Carey Act entries, desert-land entries, or entries on irrigated lands. Most of these have been acquired at a small price or on long-time credit, which has made it possible for farmers of small means to become owners. This fact accounts in the main for the small proportion of tenants. The native white farmers in 1910 numbered 18,163, foreign-born farmers 6853, and the negro and other nonwhite farmers 1196. Of the foreign-born white farmers 1320 were born in Canada and 1146 in Germany. The greater part of the remainder were born in the British Isles or the Scandinavian countries.

The following table gives the acreage, value,

PRODUCTS	Acreage	Prod. bu.	Value
Wheat.....	910,000	18,356,000	$16,704,000
Oats.....	530,000	18,550,000	7,234,000
Potatoes...	37,000	5,180,000	3,315.000
Flaxseed...	320,000	2,560,000	3,072,000
Hay.....	700,000	*1,750,000	15,225,000
Rye.....	10,000	210,000	147.000
Barley.....	70,000	2,135,000	1,132,000
Corn.....	50,000	1,400,000	1,064,000

* Tons.

and production of the principal crops in 1914. The figures are estimates of the United States Department of Agriculture. The total value of crops in 1909 was $29,715,000, and the combined acreage was 1,848,113, representing 50.8 per cent of the total improved land in farms. About two-fifths of the total value of crops in 1909 were contributed by the cereals and another two-fifths by hay and forage. The remainder, representing 17.3 per cent of the total, consisted chiefly of potatoes and other vegetables, grains and seeds other than cereals, fruits, forest products, and sugar crops. In that year the leading crops in the order of their importance were hay and forage, oats, wheat, and potatoes. The acreage of hay and forage in 1909 was 1,135,376, and their production amounted to 1,692,656 tons, valued at $12,344,606. Oats had an acreage of 333,195 and a value of $6,148,021 for the production of 13,805,735 bushels. Wheat was not greatly below oats in its acreage, amounting to 258,377. The production was 6,251,945 bushels, valued at $5,329,389. The total acreage of potatoes and other vegetables in 1909 was 28,010 and their value $2,227,736. Excluding potatoes, the acreage of vegetables was 7300 and their value $929,000.

The principal orchard fruit produced is apples, of which there were grown, in 1909, 567,054 bushels, valued at $566,938. Other fruits grown in smaller quantities are pears, plums, prunes, and cherries. The total value of the orchard fruits in 1909 was $609,078. Strawberries are by far the most important of the small fruits. There were produced, in 1909, 406,038 quarts of strawberries, valued at $46,870. Other important small fruits are blackberries and dewberries, raspberries and loganberries, currants, gooseberries, and cranberries. The total value of small fruits in 1909 was $86,586. The growing of sugar beets is an industry of considerable importance. There were produced, in 1909, 109,434 tons, valued at $546,832.

Live Stock and Dairy Products. In its early history stock raising largely monopolized the agricultural industry. Montana still remains one of the most important stock-raising States, but the industry is of less relative importance than formerly. It is one of the leading States in the raising of sheep and the production of wool. While the herds of cattle are not as large as formerly, they are improved in breed and are more numerous. Considerable attention is also given to the raising of horses for the Eastern market. The total value of domestic animals on the farms in 1910 was $84,999,659. On Jan. 1, 1915, it was estimated that there were 791,000 cattle other than milch cows, valued at $38,759,000; milch cows numbered 114,000, valued at $8,550,000; horses 391,000, valued at $33,626,000; mules 4000, valued at $392,000; sheep 4,379,000, valued at $19,268,000. In the quantity of sheep in 1914 Montana was exceeded only by Wyoming.

The total value of milk, cream, and butter fat sold and butter and cheese made in 1909 was $2,093,594. There were sold 3,584,689 gallons of milk and 1,234,263 pounds of butter. The total number of fowls on the farms in April, 1910, was 966,690, valued at $628,436.

Irrigation. Conditions in Montana make it necessary for a large proportion of its farm land to be irrigated before crops can be grown. Montana ranked second in 1909 in the total acreage of its land irrigated. There were in that year 8970 farms in which irrigation in some form was practiced, and the total acreage irrigated was 1,679,084, or about 45 per cent of the improved land in farms. The acreage included in irrigation projects in that year was 3,515,602. The length of irrigating ditches in 1909 was 18,934 miles. There were in 1914 three important irrigation projects in the course of construction by the United States government. These were the Huntley, the Milk River, and the Sun River projects. There was also the lower Yellowstone project, of which part is in Montana and part in North Dakota. The total investment in these projects exceeds $5,000,000.

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE — FIVE LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	677	13,694	11,655	$44,588	$10,901	$73,272	$24,092
	1904	382	10,196	8,957	52,590	8,652	66,415	25,485
Cars and general shop construction and repairs by steam-railroad companies.	1909	12	2,084	1,913	2,912	1,538	2,811	1,725
	1904	10	1,115	1,039	1,055	799	1,572	902
Flour-mill and gristmill products	1909	12	152	105	2,559	105	2,175	482
	1904	12	109	67	991	57	2,003	411
Liquors, malt	1909	21	349	246	3,040	359	2,440	1,838
	1904	23	322	250	2,175	285	1,732	1,245
Lumber and timber products	1909	155	3,452	3,106	8,544	2,185	6,334	4,469
	1904	47	2,408	2,218	4,846	1,512	3,121	2,667
Printing and publishing	1909	135	1,046	691	1,651	685	2,111	1,708
	1904	92	691	481	1,024	542	1,487	1,180

Forest Products. The area of forest land in 1914 was 18,977,580 acres, about 19 per cent of the gross area. The commercial forest covered about 7,882,000 acres and consisted of yellow pine, lodge pole, larch, red fir, hemlock, white fir, white pine, and cedar. The estimated stand for 1914 was 65,600,000 M feet B. M. There

were cut, in 1913, 357,974 M feet of rough lumber, most of which was soft wood. Most of the timber milled was Western pine and larch. In the production of the latter Montana is the leading State. There were 109 active mills in 1913. In addition to the lumber sawed in mills there were produced on the farms in 1909 forest products valued at $541,800.

Manufactures. Montana is a mining and agricultural State, and its principal manufacturing industries are those supplementary to its mining interests.

Copper mining and smelting form by far the most important manufacturing industry, but statistics for this are not shown because to do so would tend to disclóse the operations of individual establishments. General information in regard to this industry will be found in the section on *Mining*. The most important industry for which figures can be shown is that connected with the manufacture of lumber and timber products. (See FOREST PRODUCTS.) Third in importance are industries connected with the manufacture and repair of cars, and fourth the manufacture of malt liquors.

The average number of wage earners in 1909 was 11,655, of whom 11,436 were males. The wage earners 16 years of age or under numbered only 30, of whom 29 were males. For the great majority of wage earners the hours of labor ranged from 54 to 60 a week in 1909. The State has six cities with a population over 10,000: Butte, Missoula, Helena, Anaconda, Great Falls, and Billings. In 1909 only 9.2 per cent of the total value of products in the State and only 15.7 per cent of the average number of wage earners were reported from these cities. Great Falls, with its large copper smelters, is the only one of the six cities in which is located a distinctively important industry.

Transportation. The eastern part is a high plateau devoted mainly to stock raising and is very sparsely settled. It has no large cities and very limited railway facilities. The western part, more largely a mining and manufacturing community, with several cities of commercial importance, has better transportation. There are no navigable rivers of any account. Colorado alone of the Rocky Mountain States excels Montana in railway mileage. Three lines, the Great Northern, the Northern Pacific, and the Chicago, Milwaukee, and St. Paul, cross the State from east to west. Each of these has a number of branch lines or feeders. There are also other lines. The total railway mileage on Nov. 1, 1914, was 4783, including main line and branches. Of this, the Great Northern had 1628 miles, the Northern Pacific 1459, the Chicago, Milwaukee, and St. Paul 1049, the Chicago, Burlington, and Quincy 135, and the Oregon Short Line 135. In many sections stages are the only means of conveyance, and in mountain regions saddle horses and pack mules are largely used. The regulation of railroad rates is in the hands of a State Railroad and Public Service Commission.

Banks. The organization of all banks is under the supervision of the State Auditor, and is controlled by stringent legislation. The first national bank was organized in 1867. On Sept. 12, 1914, there were 61 national banks, of which the aggregate capital was $5,370,000; surplus, $2,687,750; loans, $30,800,819; cash, etc., $1,057,225; and deposits, $38,577,144. The State banks on June 30, 1914, numbered 190, and their combined capital was $6,000,000; surplus, $1,101,438; cash, etc., $180,180,000; loans, $23,575,749; and deposits, $23,455,935. There were 11 loan and trust companies and 21 private banks.

Government. The present constitution was adopted by a constitutional convention on Aug. 17, 1889, and was ratified by the people the following October first. The State was admitted to the Union, Nov. 8, 1889.

Legislative.—The legislative authority is vested in a Legislative Assembly, consisting of a Senate and a House of Representatives. The House of Representatives, in 1915, consisted of 93 and the Senate of 39 members. Members of both Houses must have resided for at least 12 months prior to their election in the county or the district from which they are elected. Representatives serve for two years and Senators for four years. Sessions of the Legislature must not exceed 60 days in length. The Assembly meets every two years on the first Monday in January. The sole power of impeachment is vested in the House of Representatives and all impeachments are tried by the Senate. An amendment providing for the initiative and referendum was adopted in 1906.

Executive.—The executive department consists of the Governor, Lieutenant Governor, Secretary of State, Attorney-General, State Treasurer, State Auditor, and the Superintendent of Public Instruction, each of whom holds office for four years. The Governor, Lieutenant Governor, and Superintendent of Public Instruction must be at least 30 years of age at the time of their election. The supreme executive power is vested in the Governor. The executive machinery operates, except for the functions peculiar to each office, through a system of boards composed of the executive officers.

Judiciary.—The judicial power is vested in a supreme court, in district courts, justices of the peace, and inferior courts for incorporated towns or cities. The supreme court consists of three justices. Justices of the supreme court are elected for a term of six years. The State is divided into judicial districts, in each of which there is elected one judge of the district court, whose term is four years. The number of districts may be increased or decreased by the Assembly.

Suffrage and Elections.—Every person of the age of 21 years or over who is a citizen of the United States and has resided in the State one year immediately preceding the election at which he offers to vote is entitled to vote. There is a primary law providing for party nominations by direct vote. It is modeled on the Wisconsin law. Primaries are held 70 days preceding any general election. Nominations are made by petition. Candidates for Senator and Representative may include in their petitions statements pledging their votes for that candidate for United States Senator who shall have received the highest number of votes for that position at the general election next preceding the election of a Senator in Congress, or they may declare that such vote is considered by them as merely a recommendation and not binding. During presidential primaries voters have the opportunity to express their preference, on their party nominating ballot, for their choice for President and Vice President. A candidate's expenses are limited to 15 per cent of one year's salary of the office for which he is a candidate.

Local and Municipal Government.—In each county there are elected three commissioners for a term of six years, a county clerk, sheriff, treasurer, and other necessary officers. The primary law described above applies to the nomination of candidates for municipal officers in all cities and towns having a population of 2000 and upward. Cities and towns have the right to adopt a commission form of government.

Other Constitutional and Statutory Provisions.—The legal rate of interest is 6 per cent. It is unlawful for an employer to employ children under the age of 16 years in underground mines. A period of eight hours constitutes a day's work in all works or undertakings carried on or aided by municipal, county, or State individuals, and on all contracts by them, and in mills and smelters for the treatment of ores and in underground mines. There are acts imposing liability upon railroads for injuries sustained by employees, and a measure fixing the rate of interest which may be charged to wage earners. The granting of injunctions in suits growing out of labor disputes is prohibited. There is a blue-sky law modeled after the Kansas statute. There is provision for county local option. No city or county may issue more than one license for every 500 inhabitants, except that two saloons may be licensed in any city or town.

Finance. Previous to its admission as a State the yearly budget of Montana ranged from $30,000 to $50,000. The funded debt on Nov. 30, 1912, was $1,200,000, which consisted of four series of bonds. Three of these were for the erection of the State capitol. One is an old issue—that of $350,000—and the remaining are $500,000 issued in 1909 and $150,000 issued in 1911. The capitol-building bonds are not a direct obligation of the State, but are secured by 182,000 acres of land on which the timber is valued at more than $3,000,000. The fourth issue outstanding is that of State bonds to the amount of $200,000, issued in 1909, bearing interest at the rate of 4 per cent and redeemable at the option of the State; $75,000 of these were redeemed on Jan. 1, 1913. The floating debt is made up of outstanding warrants, amounting at the end of the fiscal year 1912 to $547,910. The per capita debt, which in 1880 was $1.79, had increased in 1912 to $3.73. The receipts during the fiscal year 1913 amounted to $4,446,953 and the disbursements to $4,808,845. There was a balance on hand at the beginning of the year of $1,401,641 and at the end of $1,039,749. The chief source of revenue is taxation, and the chief expenditures are for the State educational and charitable institutions.

Militia. The total number of males of militia age in 1910 was 23,232. The organized militia consisted of a regiment of infantry and two detachments of sanitary troops. The total strength of enlisted men was 557 and of officers 53.

Population. The population at various periods is shown by the following figures: 1870, 20,595; 1880, 39,159; 1890, 132,159; 1900, 243,329; 1910, 376,053. The est. pop. in 1914 was 432,614; 1920, 548,889. The greater part of the population is found in the western or mining section. The population per square mile in 1910 was 2.6. The urban population in places of 2500 or more in 1910 was 133,420, and the rural population was 242,633. The foreign-born population in 1910 was 91,644, and the native-born whites numbered 162,127. The largest number of foreign-born whites come from Canada, but almost equally large numbers come from Austria, Germany, Ireland, and Sweden. There is an unusually large preponderance of male population. The males in 1910 numbered 226,872 and the females 149,181. The males of voting age numbered 155,017. The largest city is Butte, which in 1910 had a population of 39,165. The other large cities with their populations in 1910 are as follows: Great Falls, 13,948; Missoula, 12,869; Helena, 12,515; Anaconda, 10,134; Billings, 10,031.

Indians. The Indians, numbering about 11,000, are chiefly Blackfeet, Chippewas, Assiniboins, Gros Ventres, Sioux, and Pend d'Oreilles. They are located on reservations which embrace about 15,000 square miles of agricultural and grazing lands and have schools at Crow, Fort Belknap, Fort Peck, and Tongue River. The average attendance at these schools in 1913 was 1140. The reservations are the Blackfeet, Crow, Flathead, Fort Belknap, Fort Peck, and Tongue River. The value of the lands exclusive of timber on these reservations in 1913 was $26,971,600, and the total tribal and individual property of the Indians on the reservations was $54,468,131.

Education. The percentage of illiteracy in 1910 was 4.8. The total number of illiterates 10 years of age or over was 14,457. Among foreign-born whites the illiterates numbered 8445, or 4.9 per cent. According to the thirteenth census there were, in 1910, 93,771 persons of school age, 6 to 20 years; and of these, 60,678 attended school in that year. The report of the State Superintendent of Public Instruction for 1914 showed a total school population in that year of 114,032. Of this number there were 85,782 enrolled in the schools during the year. The total number of teachers employed was 3878, of whom 3352 were females and 526 were males. The average salary of male teachers per month was $93.29, and of female teachers $75.55. The total disbursements for school purposes in 1914 amounted to $6,954,903.

The administration of the public-school system is in the hands of State, county, and district officers. A board of trustees has supervision of the common schools of each district. Candidates for teachers' certificates are examined by the County Board of Education. This board also examines pupils applying to enter high schools. The school districts are required to keep schools open at least three months during the year, and all children between the ages of 8 and 14 are required to attend school for the full term, and children up to 16 years of age if they are unemployed. Manual and industrial training was made a part of the curriculum in 1911. The school districts having a population of more than 5000 must establish a manual-training school. In 1914 there were 55 high schools accredited for the full course and 11 others accredited for from one to three years' work. The total attendance in these higher-grade schools was 6824.

The Montana State Normal School is at Dillon. The institutions of collegiate rank include the University of Montana at Missoula, which is a part of the educational system of the State; the Montana State School of Mines at Butte; and the Montana College of Agriculture and Mechanic Arts at Bozeman. These institutions are all coeducational and under the control of the State.

Charities and Corrections. The correctional and charitable institutions are under the supervision of the State Board of Charities and Reform, which consists of three members. The institutions include the State Prison at Deer Lodge, the State Industrial School at Miles City, a home for orphans, foundlings, and destitute children at Twin Bridges, a soldiers' home at Columbia Falls, the State Hospital for the Insane at Warm Springs, and the State School for the Deaf, Blind, and Feeble-Minded at Boulder. At the State Orphans Home the State provides generously for the maintenance and education of the children confined there. The State Industrial School at Miles City is correctional and receives children, upon commitment by the district courts, between the ages of 8 and 18 years. It is very well equipped for industrial and manual training. On Jan. 1, 1914, there were 618 prisoners in the State Prison. The Legislature of 1911 passed a law giving the district courts jurisdiction as juvenile courts. In the same year was established a State tuberculosis sanitarium, especially for miners' consumption, and there was provided at the State Insane Asylum at Warm Springs an institution for the cure of persons who are suffering from mental affliction caused by the use of drugs or intoxicants.

Religion. The majority of the Church population belong to the Roman Catholic church. Other denominations having a following are the Methodists, Presbyterians, and Episcopalians.

History. The Sieur de la Verendrye is said to have traversed the region now included in the State of Montana in 1742. In 1804 the Lewis and Clark expedition crossed Montana from the northeast to the extreme southwest, and the following year, on their return journey from the Pacific coast, descended the Missouri and the Yellowstone in two parties, meeting at the junction of the rivers near the present eastern boundary of Montana. Trading posts were erected on the Yellowstone River by Manuel Lisa in 1809, William H. Ashley in 1822, and the American Fur Company in 1829. In 1840 Father Peter John de Smet of the Society of Jesus began mission work among the Flathead Indians, and this was followed by the establishment of a permanent mission among the Indians of Bitter Root valley in September, 1841. Fort Benton was founded by the American Fur Company in 1846. Gold was discovered as early as 1852 by François Finlay, a half-breed, near the Hellgate River, but the discovery aroused little attention till 1857, when John Silverthorn appeared at Fort Benton with a large quantity of gold dust which he had obtained in the mountains. In the winter of 1860 James and Granville Stuart settled on Gold Creek in the Deer Lodge valley, attracted by the rumors of gold in that region, and in the following year they commenced mining on a small scale, having been joined in the meanwhile by three other pioneers. Rich placers were soon discovered at various points in the mountains and an active immigration set in, mining settlements springing up at Bannack City, on Grasshopper Creek, on the Bighole River, and on North Boulder Creek. In May, 1863, gold was discovered at Fairweather Gulch, near Alder Creek. The town of Virginia City sprang up near the spot, and within a year it had a population of 4000. In 1863 the Territory of Idaho, including the present Montana, was set off from Washington and Dakota, and on May 22, 1864, the Territory of Montana was erected from land taken from Idaho. The early settlers were naturally of a reckless and lawless character and, as a result, for a considerable length of time life and property were in jeopardy. The existing state of affairs was, however, remedied by the stern administration introduced by the establishment of vigilance committees. The *Montana Post*, the first newspaper in the Territory, was published at Virginia City in 1865. In 1874 the seat of government was removed from Virginia City and established at Helena. On June 25, 1876, occurred the disastrous fight between General Custer and the Sioux Indians under Sitting Bull on the Little Big Horn River.

The prosperity of the Territory was increased by the completion of the Northern Pacific Railroad in 1883, surveys for the route having been made as early as 1853 by Isaac I. Stevens under authority of Congress. In January and February, 1884, a constitutional convention framed a constitution which was ratified by the people in November, and application was made to Congress for admission into the Union. No action was taken, however, until February, 1889, when an enabling Act was passed by Congress. On Nov. 8, 1889, Montana was admitted into the Union by proclamation of the President after a State constitution had been framed and State officers elected. In national elections Montana was Republican in 1892; fusion of Democrats and Populists in 1896 and 1900; Republican again in the campaigns of 1904, 1908, and 1912. From 1907 up to and including 1914 the State suffered from industrial troubles which centred about strikes in Butte and other cities. In the former year all industries in Butte were practically at a standstill as a result of the strike of nearly all classes of labor. In the presidential election of 1908 Taft received 32,333 votes, Bryan 29,326, and Debs 5855. The Democrats succeeded in electing their candidate for Governor, Edwin L. Morris, but all the other State officers elected were Republicans. On March 30, 1909, the last spike in a new transcontinental railway, the Chicago, Milwaukee, and Puget Sound, was driven at Missoula. In 1910 the Flathead Indian reservation was thrown open for settlement. In 1911 the Legislature was in deadlock from January 1 to March 2 over the election of a United States Senator to succeed Thomas H. Carter, Republican. Although the Legislature was Democratic by six votes, Senator Carter's influence was so strong that he was able to prevent the election of the Democratic Senator during this period. Henry L. Meyers, formerly a district judge, was finally elected. In the election of November 5 of that year Wilson received 27,941 votes, Roosevelt 22,456, Taft 18,512, and Debs 10,885. For Governor, Stewart, Democratic, carried the State. A Democratic Legislature was also elected. The Socialists have for many years been increasing in political power, and in 1911 succeeded in electing a mayor in Butte. On Jan. 4, 1913, the Legislature elected Thomas J. Walsh as United States Senator to succeed Joseph M. Dixon. The most important official elected on Nov. 3, 1914, was the representative at large. The Democrats were successful in electing their candidate. An amendment providing for woman suffrage was carried in this election. The Governors of the Territory and State of Montana have been as follows:

TERRITORIAL

Sidney Edgerton	1864–65
Thomas F. Meagher (acting)	1865–66
Green Clay Smith	1866–69
James M. Ashley	1869–70
Benjamin F. Potts	1870–83
John S. Crosby	1883–84
B. Platt Carpenter	1884–85
Samuel T. Hauser	1885–86
H. P. Leslie	1886–89
Benjamin F. White	1889

STATE

Joseph K. Toole	Democrat	1889–93
John E. Rickards	Republican	1893–97
Robert B. Smith	Democrat and Populist	1897–1901
Joseph K. Toole	" " "	1901–1909
Edwin L. Norris	Democrat	1909–1913
Samuel V. Stewart		1913–1921
Joseph M. Dixon	Republican	1921–

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MONTANA, UNIVERSITY OF. A coeducational State institution at Missoula, Mont., founded in 1895. It maintains departments of literature, science, and the arts; schools of law, pharmacy, forestry, journalism, music, domestic science, commerce and accounting, and education; departments of correspondence study and university extension, and a bureau of public information. It offers graduate courses and grants the degrees of B.A., B.S., M.A., and M.S. There are also a summer school and a biological station. Tuition is free. The university had, in 1914–15, 80 instructors and a student enrollment of 861. The library contained 29,000 volumes. The endowment consists of 72 sections of land given by Congress in 1892. The income fund arises from the rental of lands unsold, from licenses to cut trees, and from the interest on the proceeds of the sales of lands invested in the permanent university fund, which is applied to the payment of bonds issued in 1897 for the construction and equipment of buildings. The income for maintenance amounted in 1914–15 to $191,290. The value of the property was $350,000, including a campus of 40 acres and buildings valued at $200,000. The president in 1915 was Edwin B. Craighead, LL.D.

MONTANA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS. A State institution for agricultural and scientific education, founded at Bozeman, Mont., in 1893. There are courses in agriculture, engineering, home economics, and science. The college has a campus of 60 acres, and also owns two farms of 160 acres each and a dry farm of 640 acres. There was originally granted to the college for its support 140,000 acres of land. Of this, 25,928 acres have been sold, 114,072 remaining unsold, and 95,075 are under lease. The receipts from the sale of land in 1913–14 amounted to $208,965 and from the sale of timber $155,890. Appropriations from the State amount to about $80,000 annually. The students in all courses in 1915 numbered about 500, and there were 50 instructors. The library contains about 14,000 volumes and 1000 unbound documents. The buildings are valued at $305,000 and the equipment at $180,400. The president in 1915 was James M. Hamilton, M.S.

MONTANELLI, mŏn'tä-nĕl'lē, GIUSEPPE (1813–62). An Italian author and statesman, born at Fucecchio, Jan. 21, 1813. He studied law at Pisa and began to practice there, composing meanwhile verses which appeared at Florence in 1837. He became professor of commercial law in the University of Pisa, identified himself with the Liberal party there, and with two coöperators founded *L'Italia*, a periodical. After the rising of 1849 he became one of a triumvirate, with Guerrazzi and Mazzini. When Guerrazzi became dictator, Montanelli went on a mission to Paris, where he remained for 10 years. During this period he wrote a number of his works: a dramatic poem, *La tentazione*, interesting in connection with Corducci's *Satan*, and in which George Washington figures as an interlocutor; a tragedy, *Camma;* and a few political and historical treatises; the *Schiarimenti nel processo politico contro il ministero democratico* (1852); the *Appunti storici sulla rivoluzione italiana* (1859); and the most noteworthy of his writings, the *Memorie sull' Italia e specialmente sulla Toscana dal 1814 al 1849* (1853). He returned to Italy in 1859 and advocated the formation of a central Italian kingdom. He was a deputy to the Tuscan Assembly, but there he accomplished little, for all parties looked upon him with distrust and he found himself with hardly any adherents. In *L'Impero, il papato e la democrazia in Italia* (1859) he defended his own standpoint. Having founded the short-lived *Nuova Europa*, he entered the Italian Parliament in 1861, and died June 17, 1862. Consult: Provenzal, *Alla cara memoria di Giuseppe Montanelli* (Leghorn, 1862); Redi, *Ricordo biografico di Giuseppe Montanelli* (Florence, 1883); Orlando, "Il Montanelli poeto," in *Marzocco* (ib., 1910).

MONTAÑÉS, mŏn-tä-nyās', JUAN MARTÍNEZ (c.1580–1649). A Spanish sculptor in wood, born probably at Alcalá la Real. He was a pupil of Pablo de Rojas in Granada and afterward worked in Seville. His sculptures there include a "Conception," in the cathedral, an altar with figures of saints and a life-size "Christ on the Cross," and some statues in the gallery of the city. These are fine examples of his art, which is notable for purity of style and beauty of expression. In 1635 he went to Madrid, where he made a model for an equestrian statue of Philip IV, and where Velazquez painted his portrait, which is now in the Prado Museum. Consult F. Gómez, *Historia de la escultura en España* (Madrid, 1885), and B. Haendeke, *Studien zur Geschichte der spanischen Plastik* (Strassburg, 1900).

MONTANIST. See MONTANUS.

MONTA'NUS (Lat., from Gk. *Montanós, Montanos*). A Phrygian convert to Christianity about 156. He is said to have been formerly a

priest of Cybele (q.v.). He undertook to restore the faith and practice of the primitive Church, but was finally excluded from fellowship as a heretic. Montanus taught that direct divine revelation still continued, and that he himself was the mouthpiece of the Paraclete, promised in John xiv. 16. Hence his movement is often called the new prophecy. He revived the primitive conception of the speedy return of Christ to earth, and the elect were summoned to gather at the Phrygian village of Pepuza, there to await their Lord. In view of the immediate end of the present age, asceticism was their rule of life, and martyrdom was courted. Montanus insisted upon strict ecclesiastical discipline, thus rebuking the alleged laxity and worldliness in the Church at large. He declared it wrong to grant forgiveness of mortal sin, and believed that the holiness of the Church demanded the exclusion of all offenders from membership. He denied that the hierarchy possessed any right or power to restore holiness when it had been forfeited through sin, and thus he took his stand against the theory of sacramental grace. Closely associated with Montanus were two women, Prisca (or Priscilla) and Maximilla, supposed to be endowed like himself with the spirit of ecstatic prophecy. Like the "spiritual gifts" of the apostolic age (cf. 1 Cor. xii), the prophetic spirit might rest upon any one, and this divine equipment marked out the leaders of the Church. Revelation was imparted without any activity on the prophet's part; he was passive like the lyre when struck with the plectrum. Maximilla was held to be the last of the prophets. She died in 179. Montanus' death was earlier, but the exact year is unknown. The Montanists spread rapidly, and Asiatic synods were early held against them. They were known in Rome as early as the time of Soter (165–174), who pronounced an adverse judgment upon their claims, as did several of his successors. They were excluded from the Catholic church and organized as a separate body. Their most distinguished convert was Tertullian (q.v.), whose later writings are the chief literary monuments of the Montanist movement. Excluded from the Catholic church, the Montanists did not long survive in the West, but in the East they are found as late as the sixth century, when Justinian finally suppressed them. The movement was the last protest of the ancient belief in direct inspiration against the growing ecclesiasticism of the Church, but it was largely discredited because of its extreme positions.

Consult the later writings of Tertullian, translated into English in *The Ante-Nicene Fathers*, edited by Roberts and Donaldson, vols. iii and iv (Edinburgh, 1868); Smith and Wace, *Dictionary of Christian Biography*, article "Montanus" (London, 1877–87); J. de Soyres, *Montanism and the Primitive Church* (Cambridge, 1878); Bonwetsch, *Geschichte des Montanismus* (Erlangen, 1881); Adolf Harnack, *History of Dogma*, vol. ii (Boston, 1896); Robert Rainy, *The Ancient Catholic Church* (New York, 1902).

MONTARGIS, môn'tär'zhē'. A town in the Department of Loiret, France, at the confluence of the Loing and the Vernisson, and at the junction of three canals connecting the Seine and the Loire, 47 miles east-northeast of Orléans (Map: France, N., H 5). Among its chief buildings are the thirteenth-century church of La Madeleine with a fine choir, the town hall containing an art gallery, and the remains of the former imposing twelfth-century castle, which was formerly a royal residence, and the modern town hall, library, and museum. A bronze monumental group commemorates the "Dog of Montargis," who is said to have revealed his master's murderer by constantly following him. (See AUBRY DE MONTDIDIER.) There are considerable manufactures of paper, cotton goods, asphalt, rubber, tar, chemicals, leather, shoes, and cutlery, and a good trade in sheep, grain, wax, and honey. Anciently Montargis was the capital of Gâtinais. During the English occupation it was attacked on several occasions, and successfully resisted a siege in 1427. Until the palace at Fontainebleau was built, the castle at Montargis was a favorite royal residence and became known as "the Cradle of the Children of France." It is the birthplace of Mirabeau. Pop., 1901, 12,351; 1911, 12,927.

MONTAUBAN, môn'tō'bän'. The capital of the Department of Tarn-et-Garonne, France, situated on an elevation above the confluence of the Tarn and Tescou, in a rich and beautiful country, 31 miles north of Toulouse (Map: France, S., F 4). It is a handsome, well-built town, has a Renaissance cathedral finished in 1739, a Protestant theological college, a public library, a seventeenth-century town hall with a splendid museum containing many paintings by the artist Ingres, and the ancient castle of the counts of Toulouse. The cathedral contains Ingres's famous "Vow of Louis XIII." The town is the seat of a bishop. Cloth, sugar, lumber, furniture, hats, and metal ware are manufactured, but the chief activity of the town is its trade in horses, poultry, grain, oil, and wine. Its institutions include a school of commerce, a training college, a lyceum, and a theological faculty. Montauban originated in the abbey of St. Théodard or Montauriol, built in the eighth century on the site of the Roman Mons Albanus. The town's growth dates from its founding in 1144 by Count Alphonse of Toulouse as a refuge for serfs. It suffered severely during the Albigensian wars of the thirteenth century. It was an episcopal see from 1317 to 1560, when the inhabitants who had embraced the Protestant faith destroyed the cathedral. As one of the Huguenot strongholds it was a frequent object of attack. In 1621 it was unsuccessfully besieged by the forces of Louis XIII for 86 days, but the fall of La Rochelle in 1629 entailed its submission and the destruction of its fortifications. Ingres, the artist, was born at Montauban. Pop., 1901, 30,506; 1911, 29,778.

MONTAUK, mŏn-tąk'. An Algonquian tribe formerly inhabiting the eastern end of Long Island and claiming sovereignty over most of the other tribes of the island. Their principal village was near Montauk Point. When first known they were a numerous people, but having been reduced by a pestilence in 1658 to about 500 souls, they were invaded by the Narragansett from the mainland and forced to seek shelter among the white settlers at Easthampton. A century later only 162 remained. Many of these joined a kindred band in New York about 1788, and in 1829 only about 30 were left on Long Island and these are now extinct. In 1914, 29 of this tribe were living with the Stockbridge in Wisconsin.

MONTAUK POINT. A promontory at the eastern end of Long Island, in Suffolk Co., N. Y. (Map: New York, D 2). On it are located a stone lighthouse 168 feet high, equipped with a flashing white light visible 19 (nautical) miles, a Daboll fog trumpet, and a United States life-saving station. United States and State troops had an encampment here, called Camp Wyckoff, after the Spanish-American War. The point was named from the Montauk Indians.

MONTAUSIER, môn'tō'zyā', CHARLES DE SAINTE-MAURE, MARQUIS DE (1610–90). A French soldier. He was educated at Sedan, rose rapidly in the army, and in 1645 became Governor of Saintonge and Angoumois. Although reared a Huguenot he supported the crown during the Fronde (q.v.). Wounded at Martangais in 1652, he returned to Paris. In 1663 he became Governor of Normandy, was created Duke in 1665, and served as guardian of the Dauphin from 1668 to 1679. At his direction the edition of the Latin work *Ad Usum Delphini* was published. He was a patron of Boileau and Racine and was famed for his brusque manners and his austere piety. It is supposed that he was the original of Molière's *Misanthrope.* He was the long-time suitor of Mademoiselle Julie de Rambouillet, first dame d'honneur, whom he married and for whom he prepared the *Guirlande de Julie,* a book of unpublished autograph verse by various authors.

MONTBÉLIARD, môn'bā'lyär'. A town in the Department of Doubs, France, 9 miles southwest of Belfort (Map: France, N., M 5). It lies in a valley between the Vosges and Jura mountains, at the confluence of the Allaine and the Lisaine, and on the Rhone-Rhine Canal. The strikingly situated fifteenth-century castle was an important German post during the battle of Héricourt in 1871. It forms one of a chain of fortifications extending from Belfort to Besançon. Among several public statues there is one to Cuvier, the naturalist, born here in 1769. The principal industries are watchmaking and the manufacture of hardware, machinery, tools, silk and cotton goods, agricultural instruments, lace, and timber. Wine, leather, cheese, and the famous Montbéliard cows are exported. Montbéliard belonged to Württemberg intermittently from the close of the fourteenth century to the French Revolution. Pop., 1901, 10,034; 1911, 10,392, chiefly Protestants.

MONT BLANC, môN bläN (Fr., white mountain). The highest mountain in Europe outside of the Caucasus. It forms with the bordering heights an independent elongated ridge of the western Alps, on the boundary between France (Savoy) and Italy (Piedmont) (Map: France, S., L 3). It is situated a short distance west of the Pennine Alps and north of the Graian Alps, about 40 miles south of Lake Geneva. It is composed of crystalline rocks bordered by Jurassic and Triassic strata which exhibit the fan-shaped arrangement characteristic of Alpine peaks. The highest point (15,781 feet), generally known as Mont Blanc, is in France, 7 miles south of the Swiss boundary. It is covered by an immense cap of ice more than 75 feet thick, from which glaciers extend downward in all directions, feeding the tributaries of the Rhone on the north and of the Po on the south. The largest glaciers run northward into the valley of Chamonix, the chief being the Glacier du Géant, which extends almost to the bottom of the valley and is known in its lower course as the Mer de Glace. The line of perpetual snow is at an altitude of 8600 feet. The summit is surrounded by a series of lower, steep, and needle-like crags (*aiguilles*), and the ascent is dangerous and fatiguing, many persons having perished in the attempt. The first ascent was made in 1786 by the guide Balmat, induced by a prize offered by the scientist Saussure, who himself accomplished the ascent the following year and made some of the earliest scientific observations in high altitudes. The summit is ascended by large numbers of tourists every year. French engineers have projected a railway to the summit and have already constructed it as far as Mont Lachat, 7000 feet. Two meteorological and astronomical observatories are located on Mont Blanc, one built in 1890 at an altitude of 14,324 feet, the other built in 1893 on the summit.

Bibliography. Doblhoff, *Der Montblanc* (Vienna, 1880); Güssfeldt, *Der Montblanc* (Berlin, 1894); Duparc, *Le Montblanc, au point de vue géologique et pétrographique* (Geneva, 1896); Durier, *Le Montblanc* (4th ed., Paris, 1897); Mathews, *The Annals of Mont Blanc* (London, 1898); Whymper, *Chamonix and the Range of Montblanc* (7th ed., London, 1902); and the authorities referred to under MOUNTAIN CLIMBING.

MONT BLANC RUBY. See RUBASSE.

MONTCALM DE SAINT-VÉRAN, môn'kälm' de săN-vā'răN'; *in English commonly called* mŏnt-kăm', LOUIS JOSEPH, MARQUIS DE (1712–59). A distinguished French general. He was born at Candiac, near Nîmes, Feb. 29, 1712, entered the army in 1721, and became a captain in 1728. He served in Italy and Germany for many years and was wounded five times at the battle of Piacenza in 1746. In May, 1756, he was sent to Canada to command the French forces. He captured Fort Ontario at Oswego in August of the same year. The next year he forced the capitulation of Fort William Henry at the head of Lake George, with an English garrison of 2500 men, capturing 42 guns and a large amount of stores. In 1758 he defended Fort Ticonderoga with 3600 Canadians against General Abercromby at the head of 15,000 English, repulsing the latter after a determined attack (July 8). The loss of this battle would have meant the complete downfall of French power in America. Lack of troops, ammunition, and provisions, and the large reënforcements of the English, obliged Montcalm to retire all his forces the following year to Quebec, which was menaced by a powerful army under General Wolfe. Ill supported by the French government and forced to cope with disaffection among the authorities in Canada, Montcalm prepared to meet the inevitable outcome with a heroic determination which has lent so much romantic interest to his last days. The struggle around Quebec began July 31, 1759, and the siege continued for six weeks, until Wolfe's scaling of the Heights of Abraham above the city tempted the French to a battle in the field, in which the English were victorious, Sept. 13, 1759. Wolfe fell dead in the moment of victory, and Montcalm was borne from the field mortally wounded and died the following day. The city was surrendered a few days after his death, and its fall signalized the end of the French power in Canada. In 1827 Governor Dalhousie, of Canada, caused a monument to be erected in Quebec to

the joint honor of the two brave generals. The best work on Montcalm is by Parkman, "Montcalm and Wolfe," in *France and England in North America*, part vii (2 vols., Boston, 1885). Consult also: Bonnechose, *Montcalm et le Canada française* (Paris, 1877); Falgairolle, *Montcalm devant la postérité* (ib., 1886); Doughty, *The Siege of Quebec and the Battle of the Plains of Abraham* (Quebec, 1901).

MONTCEAU-LES-MINES, môn'sō'-lā'-mēn'. A town of east France, in the Department of Saône-et-Loire, on the Canal du Centre, 31 miles northwest of Mâcon (Map: France, N., K 6). It is the centre of the Blanzy coal-mining region and has iron and copper foundries, machine shops, tile and textile factories. Pop., 1901, 28,779; 1911, 26,830.

MONT CENIS, môn se-nē'. See CENIS, MONT.

MONTCHRESTIEN, môn'krā'tyăn', ANTOINE DE (c.1576–1621). A French playwright and economist. His father was an apothecary. Having left his birthplace, Falaise, the lad went to the College of Caen. In 1596 he published the tragedy of *Sophonisbe*, which was followed by *L'Ecossaise, ou Marie Stuart; Les Lacènes; David; Aman;* a revision of *Sophonisbe* called *La Carthaginoise;* and *Hector* (1604). Meanwhile Montchrestien was working on a history of Normandy, which was never printed and is now lost. A duel caused him to flee to England, whence he returned with a head full of economic theories. He started a steel mill at Aussonne-sur-Loire with a store in Paris. His *Traité d'économie politique* appeared in 1615. Our expression "political economy" is merely a translation of the phrase coined by Montchrestien. He was slain during a Huguenot stir near Falaise, Oct. 8, 1621. Consult: Duval, *Mémoire sur Antoine de Montchrestien* (Paris, 1868); Funck-Brentano, *Montchrestien, sa vie et son œuvre* (ib., 1889); Louis Petit de Julleville, *Les tragédies de Montchrestien* (ib., 1891); Sporleder, *Ueber Montchretiens "Ecossaise"* (Marburg, 1892); Lauson, *Hommes et livres* (1895); Paul Lavalley, *L'Œuvre économique d'Antoine de Montchrestien* (Caen, 1903).

MONTCLAIR'. A town in Essex Co., N. J., 5 miles north by west of Newark, on the Morris Canal and on the Lackawanna and the Erie railroads (Map: New Jersey, D 2). It is picturesquely situated on the slope of one of the ranges of the Orange Mountains, its highest point having an elevation of about 650 feet, the average elevation being about 300 feet, and is chiefly a residential town, though of some reputation as a summer resort. The heights command a fine view of New York and its harbor. The town has a hospital, two orphan asylums, a State normal school, art museum, fine high-school building, a public library, and the Montclair Military Academy. There are also a few manufactories, including paper mills and hosiery mills. Pop., 1890, 8656; 1900, 13,962; 1910, 21,550; 1914, 24,782; 1920, 28,810.

Until separately incorporated in 1868, Montclair was a part first of Newark and then of Bloomfield. The upper section was settled by Dutchmen from Hackensack and called Speertown, the lower by Englishmen from Newark and called successively Cranetown and West Bloomfield. The present name was not adopted until 1865. Consult Harris, *An Historical Sketch of Montclair* (Montclair, 1881).

MONT-DE-MARSAN, môn'-dē'-mär'săn'. Capital of the Department of Landes, southwest France, situated at the junction of the Midou and the Douze, 64 miles south of Bordeaux (Map: France, S., D 5). It has a normal school, a library, a lycée, an old castle, and fine public gardens. The chief manufactures are resins, turpentine, iron goods, lumber, and machinery, which, together with wine and live stock, are the chief exports. Pop. (commune), 1901, 11,604; 1911, 12,091.

MONT DE PIÉTÉ. See MONTS DE PIÉTÉ.

MONTDIDIER, AUBRY DE. See AUBRY DE MONTDIDIER.

MONT DORE. See DORE.

MONTEAGLE, mŭnt-ē'g'l, WILLIAM PARKER, fourth BARON, and eleventh BARON MORLEY (1575–1622). An English adventurer. He was intimate with the chief Roman Catholic families of England, showed great enthusiasm for their cause, and for participating in Essex's rebellion in London in 1601 he was imprisoned for a short time and fined £8000. But when James I ascended the throne in 1603 Parker swore allegiance to him and helped the new King to get control of the Tower of London. In 1605 he was called to Parliament as Lord Monteagle. On October 26 of that year he received a letter, probably from his wife's brother, Francis Thresham, telling him of the Gunpowder Plot (q.v.) and warning him not to attend Parliament, and he was thus enabled to avert the threatened disaster. In 1609 he became a subscriber to and a member of the council of the Virginia Company.

MONTE ALBAN, môn'tā äl'bän. A picturesque ridge rising 2000 feet above the city of Oaxaca, on the summit of which is situated one of the largest ruins in Mexico. For a distance of 2 miles the crest has been leveled, terraced, and laid out in rectangular courts whose sides run towards the four directions. Around these courts are pyramids which were once crowned with temples. Only the bottoms of walls remain in place, disclosing a cement construction. In some of the mounds are narrow, stone-lined vaults. A number of sculptured slabs, some standing erect like the stelæ of the Maya cities to the south and some built against the bases of mounds, occur at Monte Alban. In addition to representing human and grotesque figures in low relief these slabs contain columns of hieroglyphs with bar at dot numerals. These inscriptions suggest those of the Maya, but it has so far been impossible to decipher any of the dates. Monte Alban was one of the early Zapotican capitals and had apparently been abandoned for many centuries before the coming of the Spaniards. Consult Holmes, *Archæological Studies among the Ancient Cities of Mexico*, in Field Museum Publications (Chicago, 1895–97), and Batras, *Exploraciones de Monte Alban* (Mexico, 1902).

MONTEBELLO, môn'tā-bĕl'lō. A village in the Province of Pavia, Italy, 12 miles south-southwest of Pavia. There on June 9, 1800, the French under Lannes defeated the Austrians. The engagement is sometimes called the battle of Casteggio, after a neighboring town. In May, 1859, the Austrians were again defeated here by the united armies of the French and the Piedmontese. Pop., 1901, 2119; 1911, 2183.

MONTEBELLO, DUKE OF. See LANNES, JEAN.

MONTE CARLO, kär'lō. A town in the Principality of Monaco (q.v.), picturesquely situated on a beautiful and isolated elevation

rising above a bay of the Mediterranean, a little over one mile northeast of Monaco, the capital of the principality (Map: France, S., M 5). The climate is celebrated for its salubrity and mildness. The town is most attractively laid out as a pleasure resort and its scenic surroundings are celebrated. The Casino, containing the gaming rooms to which Monte Carlo owes its fame and the principality its welfare, is a splendid building amid beautiful gardens, and contains besides the *salles de jeu*, a luxuriously appointed *salle des fêtes*, a reading room, etc. The chief games played are roulette and trente-et-quarante, with stakes ranging from 5 to 6000 and from 20 to 12,000 francs respectively. The gaming tables of Monte Carlo are patronized by people from all over the world, but are forbidden to the natives of the principality. The town was founded in 1856 and has been used as a gambling resort since its foundation. In 1861 the Casino was leased for 50 years to M. François Blanc, after whose death the control of the concern passed to a joint-stock company, capitalized at 30,000,000 francs. In 1898 the company obtained an extension of its concession to 1947. The company engaged to pay to the Prince of Monaco £400,000 in 1899 and £600,000 in 1913, and to increase its annual tribute from £50,000 to £70,000 in 1907, to £80,000 in 1917, to £90,000 in 1927, and to £100,000 in 1937. The town had, in 1913, 9627 inhabitants.

MONTE CASSINO, kȧs-sē′nō. A monastery situated on a hill overlooking Cassino (q.v.) in the Province of Caserta, Italy, 45 miles northwest of Naples. It was founded by St. Benedict about 529 on the site of a temple of Apollo, and was the original home of the Benedictine Order. It was destroyed and rebuilt several times and the present buildings were erected from 1637 to 1727; they are remarkable for their noble architecture and beautiful situation. The library and archives, containing 50,000 printed books and 30,000 incunabula, are historically famous. In 1866 the monastery was enrolled as a "national monument."

Bibliography. Tosti, *Storia della badia di Montecassino* (Rome, 1889–1890); Taeggi, *Paleografia artistica di Montecassino* (Monte Cassino, 1876 et seq.); Rickenbach, *Monte-Cassino von seiner Gründung bis zu seiner höchsten Blüte unter Abt Desiderius* (Einsiedeln, 1884–85); Clausse, *Les origines bénédictines* (Paris, 1899).

MONTECATINI DI VAL DI NIEVOLE, mōn′tȧ-kȧ-tē′nē dē väl dē nyā′vō-lā. A town in the Province of Lucca, Italy, 1180 feet above the sea, 24 miles northwest of Florence. The warm baths below the town (*Bagni di Montecatini;* pop. (commune), 1911, 5526), dating from the fourteenth century, are much frequented by invalids. Pop. (commune), 1911, 3355.

MONTE CENISIO, mōn′tȧ chȧ-nē′zyō. See Cenis, Mont.

MONTE CIRCEO. See Circei.

MONTE CORVINO, mōn′tȧ kôr-vē′nō, Giovanni di (c.1247–c.1328). A Franciscan missionary and traveler. In 1289 he was sent by the Pope as legate to the Great Khan of Persia. From thence he went to the Coromandel coast of India about 1291–92. He was next heard of in Peking, where he arrived before 1305. Pope Clement V created him Archbishop of Peking in 1307, and in the following year three bishops arrived to assist him. He established three mission stations in Peking and one near Amoy harbor, and enjoyed considerable success. Monte Corvino's letters were published in the *Münchner gelehrte Anzeigen*, no. 22, part iii (1855).

MONTE CRISTI, krĭs′tē. A seaport of the Dominican Republic, situated on the north coast near the Haitian frontier (Map: West Indies, E 2). The town has a large harbor 7 miles in circumference and carries on an active export trade in hides, molasses, coffee, and tobacco. It is the station of a United States consular agent. Pop., 5000.

MONTE CRISTO, krĭs′tō. A small island off the west coast of Italy, 28 miles south of the island of Elba (Map: Italy, C 3). It consists largely of a mountain of granite, rising 2000 feet above the sea, and was made a penal colony in 1874. Monte Cristo acquired fame through Dumas's novel *The Count of Monte Cristo.*

MONTE CRISTO, The Count of. The most famous romance of Alexandre Dumas (1844–45), founded on Penchet's *A Diamond and a Vengeance.* The hero, Edmond Dantès, is unjustly imprisoned in the Château d'If (see If), escapes, and after discovering a fabulous treasure on the island of Monte Cristo, pursues with his vengeance those to whom his sufferings were due.

MONTECUCCOLI, mōn′tȧ-kōō′kō-lē, or **MONTECUCULI,** mōn′tȧ-kōō′kụ-lē, Raimondo, Count (1609–80). An Austrian general. He was born near Modena and entered the Austrian artillery as a volunteer under his uncle, Ernesto, Count Montecuccoli, in 1625. During the Thirty Years' War he was employed in various services, military and diplomatic. In 1657 he was sent to support John Casimir of Poland against the Swedes and Prince Rákóczy of Transylvania, and compelled Rákóczy to make peace with Poland and to break his alliance with the Swedes. In the following year he was made a field marshal and was sent to aid the Danes against the Swedes, in which also he was eminently successful. In 1660 he commanded the army sent to oppose the Turks, who had broken into Transylvania, and after an indecisive warfare of three years he won the great battle of St. Gotthard, on the banks of the Raab, Aug. 1, 1664, defeating Kiuprili and forcing the Turks to sign a twenty years' peace. In the war between France and Holland, in which the Emperor took part with Holland, Montecuccoli was given the command of the Imperial army in 1672. He took Bonn and, notwithstanding the endeavors of Turenne to prevent it, effected a junction with the Prince of Orange. In 1675 he was opposed to Turenne on the Rhine, and they spent months in manœuvres in which neither could gain any advantage and which ended in the death of Turenne. Montecuccoli then pursued the French across the Rhine. The Emperor Leopold made him a prince of the Empire, and the King of Naples bestowed on him the Duchy of Melfi. His memoirs were published in French (Amsterdam, 1770) and in the original Italian by Ugo Foscolo (Milan, 1807) and by Grassi (Turin, 1821). Consult also Campori, *Raimondo Montecuccoli, la sua famiglia e i suoi tempi* (Florence, 1877), and Grossmann, *Raimund Montecuccoli* (Vienna, 1878).

MONTEFIASCONE, mōn′tȧ-fyȧs-kō′nȧ (It., bottle mountain) (Map: Italy, C 3). An episcopal town in the Province of Rome, Italy, 9 miles northwest of Viterbo. It is situated 3

miles from the railway station at an altitude of 2076 feet, commanding a magnificent view of Lake Bolsena. The ancient walls are still standing. Its chief buildings are the uncompleted cathedral of Santa Margherita, the early eleventh-century Romanesque-Gothic church of San Flaviano, and a sixteenth-century castle. Montefiascone is celebrated for its high quality of muscat wine. The town dates from the sacred Etruscan Fanum Voltumnæ. Pop. (commune), 1901, 9371; 1911, 9563.

MONTEFIORE, mŏn'tê-fī-ō'rê, CLAUDE JOSEPH GOLDSMID (1858–). An English educator and author. He was born in London of Jewish parents and was educated at Balliol College, Oxford. He devoted himself to communal work in behalf of London Jews, held various high offices in Jewish institutions in London, and with Israel Abrahams edited the *Jewish Quarterly Review.* He became president of the Anglo-Jewish Association. Montefiore delivered the Hibbert lectures for 1892 on the *Origin and Development of the Religion of the Ancient Hebrews.* With Israel Abrahams he wrote *Aspects of Judaism* (2d ed., 1895); and he is sole author of *Liberal Judaism* (1903); *The Synoptic Gospels* (1909); *Some Elements of the Religious Teachings of Jesus* (1910), the Jowett lectures.

MONTEFIORE, SIR MOSES HAYIM (1784–1885). A Jewish philanthropist. The scion of a wealthy Anglo-Italian banking family, he was born at Leghorn, Italy, Oct. 24, 1784. He was educated in London, became a member of the Stock Exchange, and in 1824, having realized a large fortune, retired from commercial pursuits and commenced a crusade for the amelioration of his race. In 1812 he married Judith Cohen, whose sister had married the head of the great Rothschild banking house. He was strenuous in his efforts to remove the civil disabilities of Jews in England, and finally, overcoming great opposition, received the honors of election as High Sheriff of Kent, and Sheriff of London in 1837, when he was knighted. In 1846 Queen Victoria made him Baronet. From 1827 to 1875 he made seven journeys to the Orient, conferring great benefits on his kindred, and being everywhere received by the rulers with the greatest marks of respect. He spent the last years of his life at Ramsgate, where, in 1865, he had endowed a Jewish college to the memory of his wife, who died in 1862. He died there July 28, 1885, in his one hundred and first year. Consult Loewe (ed.), *Diaries of Sir Moses and Lady Montefiore* (London, 1890).

MONTE'GO BAY. A seaport on the north coast of Jamaica, 18 miles west of Falmouth (Map: West Indies, C 3). It has a good harbor defended by a battery, and a general trade of some importance. A United States consular agent resides in the town. Pop., 1891, 4803; 1911, 6616.

MONTÉGUT, môn'tā'gü', JEAN BAPTISTE JOSEPH EMILE (1825–95). A French writer and editor, born at Limoges. He practiced law until 1847, when he entered the field of letters by an article in the *Revue des Deux Mondes* on the philosophy of Emerson. Later he translated the works of Emerson, Macaulay, and Shakespeare into French, and it is chiefly because of his introducing these writers to French readers that he is remembered. In 1857 he became an editor of the *Revue des Deux Mondes,* but resigned in 1862 to join the *Moniteur Universel.* Among his writings are: *Les Pays-Bas: Impressions de voyage et d'art* (1869); *L'Angleterre et ses colonies australes* (1879); *Poètes et artistes de l'Italie* (1881); *Esquisses littéraires* (1893).

MONTEIRO, môn-tā'rō, CANDIDO BORGES (1812–72). A Brazilian physician. He was born in Rio de Janeiro and, after taking his degree (1834) at the Medical School there, served the institution as professor of operative surgery and topographical surgery from 1837 to 1862. He was physician to the Emperor, and took an active part in politics, as president of the municipal chamber of the capital, as Secretary of Agriculture, Commerce, and Public Works, and as Senator.

MONTELEONE DI CALABRIA, môn'tā-lā-ō'nā dê kä-lä'brê-ä. An episcopal town in the Province of Catanzaro, Italy, on a hill 1575 feet above the sea, about 2 miles from the Gulf of Santa Eufemia and 70 miles north by east of Reggio di Calabria (Map: Italy, F 5). Its ruined castle was built by Frederick II and its church is adorned with sculptures by Gagini of Palermo. The town has been several times devastated by earthquakes, the last in 1905. It has a trade in silk and oil. Monteleone is on the site of the Greek Hipponium, mentioned as early as 389 B.C., and the Roman Vibo Valentia. Pop. (commune), 1901, 12,997; 1911, 13,066.

MONTÉLIMAR, môn'tā'lē'mär'. A town in the Department of Drôme, France, near the confluence of the Roubron and Jabron, 27 miles by rail south of Valence (Map: France, S., J 4). It is irregularly built on a castle-crowned hill, commanding fine prospects of the Vivarais Mountains. The former castle is now a prison. Among its chief institutions are a chamber of agriculture, a communal college, and a public library. It manufactures lumber, cabinetwork, silk, cotton, corsets, hats, chocolate, vermicelli, agricultural machinery, flour, and spirituous liquors and is famed for Montélimar nougat, an almond candy. In the vicinity coal and lignite are mined. Montélimar is on the site of the Acusium of the Romans; the thermal spring at Bondonneau, 2½ miles to the southeast, anciently used by them, was rediscovered in 1854. The town was destroyed by the Saracens and rebuilt by Montheil d'Adhémar in the tenth century. Here Calvinism was first embraced in France. Coligny besieged the town unsuccessfully in 1569, but it was taken by the Huguenots in 1587. Pop., 1901, 13,351; 1911, 13,281.

MONTELIUS, môn-tā'lê-us, GUSTAF OSCAR AUGUSTIN (1843–1921). A Swedish antiquarian and ethnologist, born in Stockholm. He took his degree of Ph.D. at Upsala in 1869. From 1868 to 1888 he was connected with the Academy of Antiquities, in 1888 he was appointed professor in the State Historical Museum, and from 1907 to 1913 he was state antiquarian. He traveled widely and lectured in America as well as in Europe. He declined the directorship of antiquities in the Museum für Völkerkunde in Berlin and a professorship in the university there. His costly library was given (1913) to the Academy of Antiquities in Stockholm. He contributed largely to scientific periodicals and was editor of several. Among his works are: *Från järnåldern* (1869); *Sveriges forntid* (1872–75); *Lifvet i Sverige under hednatiden* (1873; 3d ed., 1905; Eng., Fr., Ger. trans.); *Sveriges historia från äldsta tid till våra dagar* (1875–77; Ger. trans., 1906);

La civilisation primitive en Italie depuis l'introduction des métaux, a great work, of which three volumes of plates (1895, 1905, 1911) and two volumes of text had appeared up to 1915.

MONTELUPO, mŏn'tȧ-lōō'pō, RAFFAELLO DA (c.1505–c.1567). An Italian sculptor and architect, the son of Baccio da Montelupo. He was a pupil of Michelangelo and frequently assisted him, but his work is usually clumsy and mannered. One of his best productions is the Rossi Monument in Santa Felicità, Florence. He made three statues for the tomb of Pope Julius II and partly built the monument to Leo X in the church of Santa Maria sopra Minerva in Rome, besides executing a figure of St. Damian in the Medici Chapel in Florence, several bas-reliefs in the Casa Santa at Loreto, and the tomb of Baldassare Turini in the duomo of Pescia. He left part of an autobiography, which is translated in Perkins, *Tuscan Sculptors* (London, 1864).

MONTEMAYOR, mŏn'tȧ-mȧ-yōr', or **MONTEMÔR,** JORGE DE (?1520–61). A Spanish poet and novelist, born at Montemôr-o-Velho, near Coimbra, Portugal. Little is known as to the details of his life. He seems to have studied music and to have traveled back and forth between Spain and Portugal, in the suite of various members of the two royal families, during the period 1543 to 1555, when he is thought to have gone to England and to the Netherlands in the train of Philip II of Spain. He perished in a duel (or was murdered) in 1561. With the exception of a couple of songs and a few lines of prose in Portuguese, contained in his famous pastoral romance, he composed wholly in Castilian. His literary renown is based on his unfinished *Diana enamorada*, a work modeled on the Italian pastoral novel and published about 1559. It mingles verse with the prose and beneath the fiction of the pastoral situation veils the love experiences of the author himself. An English version, made by Bartholomew Young in 1583 (printed in 1598), is of importance because of the influence which it had upon Sidney's *Arcadia* and upon Shakespeare's *Two Gentlemen of Verona*. As Montemayor's romance remained incomplete, several Spanish continuations of it were made. The best is that of Gaspar Gil Polo (1564). Lyrics of Montemayor are to be found not only in the *Diana*, but also in his *Cancionero* (Antwerp, 2 vols., 1544–58). An edition of Montemayor came out in 1886 at Barcelona. Consult: G. Schönherr, *Jorge de Montemayor, sein Leben und sein Schäferroman* (Halle, 1886); Domingo García Péres, *Catálogo de los autores portugueses que escribieron en castellano* (Madrid, 1890); J. Fitzmaurice-Kelly, in the *Revue Hispanique*, vol. ii (Paris, 1895); Marcelino Menéndez y Pelayo, "Orígenes de la novela," in the *Nueva biblioteca de autores españoles*, vol. i (Madrid, 1905); J. Marsan, *La pastorale dramatique en France* (Paris, 1905); D. Guimarães, *Bernardim Ribeiro* (Lisbon, 1908); H. A. Rennert, *The Spanish Pastoral Romances* (2d ed., Philadelphia, 1912).

MON'TEM CUSTOM, THE. A famous traditional custom at Eton College. Its origin is lost in obscurity; it is described in Malim's *Consuetudinarium* of 1560. Until 1758 its observance took place in January; when it was changed to Whitsun Tuesday, it was held every second or third year, and triennially from 1775, until it was abolished in 1847, owing to the disorder which attended it. It was a procession of the Eton boys, attired in fancy dresses, to a certain mound (*ad montem*, hence the name) known as Salt Hill. They were licensed to levy contributions, known as salt, from every visitor, and the receipts were given to the captain of the day, who kept what was left after the expenses of the festivity were paid to help him in his university career. For a full account, consult Sterry, *Annals of Eton College* (London, 1898), and Sir H. Maxwell Lyte, *History of Eton College* (ib., 1904). See also ETON COLLEGE.

MONTEMOLIN, mŏn'tȧ-mō-lēn', COUNT OF. See CARLOS, DON.

MONTEMÔR, J. DE. See MONTEMAYOR, J. DE.

MONTEMORELOS, mŏn'tȧ-mō-rā'lōs. A town of the State of Nuevo León, Mexico, 42 miles south of Monterrey, on the National Railways of Mexico (Map: Mexico, J 5). It lies in the midst of a fertile irrigated region, celebrated for its production of fruits, especially oranges. Its municipal population, in 1895, was about 3500.

MONTEN, mŏn'ten, DIETRICH (1799–1843). A German battle painter, born at Düsseldorf, where he began to study at the Academy in 1821. Later he became a pupil of Peter Hess in Munich, where, after a visit to Italy and study trips in other parts, he made his permanent home. The success of some battle pieces he exhibited led to his being commissioned to paint in the arcades of the Royal Garden three historical episodes, but his reputation dates more especially from his "Finis Poloniæ" (1832, National Gallery, Berlin), depicting the departure of the Poles from their country in 1831, a painting which became widely known through lithographic reproductions. Other specimens from his brush include "Death of Gustavus Adolphus at Lützen" (1835, Hanover Museum) and "Napoleon on a Reconnaissance" (New Pinakothek, Munich).

MONTENEGRO, mŏn'tȧ-nā'grō. A kingdom of Europe, situated in the western part of the Balkan Peninsula (q.v.), between lat. 41° 55′ and 43° 30′ N. and long. 18° 30′ and 20° 45′ E. (Map: Balkan Peninsula, B 3). The name Montenegro, given to the country by the Venetians, is a translation of the Slavic Crnagora (pronounced cher-nȧ-gŏ'rȧ), which signifies Black Mountain. The mountains, however, are not black, but are white or grayish. The name was not known before the reign of Crnojevic, the Black Prince, in the fifteenth century, and he is supposed to have given his name to the mountains. The country is bounded by Servia on the east, by Albania on the south, by the Austrian Province of Dalmatia on the west, and by Herzegovina on the west and north. It has a short sea frontage on the Adriatic, but no good port. The area is estimated at 5603 square miles. Montenegro is a part of the great Karst limestone plateau which, beginning in south Austria, extends along the east side of the Adriatic through Turkey and Greece. It is crowded with mountains from 2500 to over 8000 feet in height, the highest elevations being in the northeast. Nearly the whole country is covered by the Karst formation, possessing a cold climate and a few patches of cultivable land scattered among poor pastures, and has the peculiarities of similar limestone formations. Looked at from above, the land would seem to be honeycombed with cells due to the agency of

water. Rivers fully formed suddenly rise out of the rocks and disappear as suddenly. Here they have scooped out wide valleys and there they have merely produced sink holes into which they vanish. Thus, large parts of the country have little surface water, and the inhabitants use rain water or snow. The two important rivers are the Zeta and the Morača. The Zeta disappears in a chasm on the plain of Nikšić and reappears miles away at the head of the Zeta valley, the largest valley and the most fertile part of Montenegro. The Morača flows between stony banks, along which no track leads, and joins the Zeta, and their waters empty into the Lake of Scutari, on the borders of Albania.

Around the shores of the Lake of Scutari is a narrow plain, where agriculture is intensive; but there is no agriculture among the stony wastes of the Karst, and no crops are raised excepting in the alluvial valley of the Zeta and some smaller streams and along the coast. Agriculture is of the most primitive kind. Grain, tobacco, potatoes, and other vegetables are grown. The vine and fig thrive also, and the olive is produced along the narrow coastal plain. The mean annual temperature is from 61° F. in these regions to 35° F. on the higher parts of the plateau. On the whole the climate is raw except in the low-lying river valleys and along the coast. The pasture lands, poor as they are, afford grazing for cattle, goats, and sheep, which are the chief riches of the country. There are about 500,000 sheep and goats, 60,000 cattle, 8000 swine, and 3000 horses.

The flora, though sparse on the whole, includes a considerable variety, on account of the diversity of climate. Practically all the useful plants the people require are grown. Scattering beeches and oak trees are about all that relieve the monotony of the mountains except in the still almost inaccessible north, where fine oak, beech, and pine forests are found, but are valueless because of lack of roads. The fauna includes the bear, wolf, and fox, and a considerable number of aquatic and other birds. The most important fish is the bleak, a considerable quantity of which is exported.

The estimated population in 1905 was 250,000, of whom, roughly, 223,500 were Orthodox Greek, 12,500 Roman Catholic, and 14,000 Mohammedan. An estimate of 1912 placed the total at 285,000. They are thinly scattered over the lower grounds, and on the slopes of the hills their rude stone huts with one door, one window, and roof of straw stand at intervals of about a quarter of a mile; around them are little patches of wheat, barley, and potatoes. The settlements are connected with one another by bridle tracks about 3 feet broad winding over limestone bowlders and covered with a loose sliding surface of limestone blocks of all sizes. Such is the characteristic aspect of the settled parts of Montenegro outside of the towns. There are few roads except those recently built which connect Cetinje, Podgoritsa (Podgorica), and Nikshich (Nikšić) with one another and the coasts. The Montenegrins have not desired roads and for ages took care not to construct them, because they feared they would open their country. The Montenegrins are an offshoot of the Servian branch of the Slavic race. Physically they are among the largest and finest people in Europe, and the conditions of their mountain life in a poor country have developed peculiarities that make them easily distinguishable from the Servians. They are a race of warriors, always ready to take arms against external encroachments and equally ready to defend at home what they regard as their personal rights. They have thus the reputation of being excitable, quarrelsome, and violent, but every man, even the poorest, has a dignified bearing. The figures for population given above relate to the country as it was before the Balkan wars of 1912–13, the area being 3506 square miles. As a result of those wars Montenegro received a considerable accession of territory, viz., 2129 square miles (estimated)—168 square miles from the former Turkish Vilayet of Scutari and 1961 square miles from Kossovo; the inhabitants of the acquired area were estimated to number 230,000, making the total population in 1915 about 520,000. Cetinje, the capital, which is but a few miles distant from the Dalmatian seaport Cattaro, has about 5300 inhabitants (exclusive of the garrison); other towns of importance are Podgoritsa (10,000), Dulcigno (5100), Nikshich (5000), and Antivari (2400). In the new territory is Jakova (14,000).

Elementary education is free and nominally compulsory, but illiteracy, especially among females, is common. There are about 120 primary schools, an agricultural school, a few secondary schools, and a theological seminary. The government until December, 1905, was a mild paternal despotism depending on the will of the Prince, who filled all executive offices; under the absolutist régime only the best men filled every grade of offices throughout the country. In 1905, however, the Prince promulgated a constitution and summoned a National Assembly (Skupshtina) of members popularly elected. A parliamentary régime was therefore introduced. On the occasion of the fiftieth anniversary of his accession Prince Nicholas, in virtue of an enactment of the Skupshtina, assumed the title of King, Aug. 28, 1910. The country also has a complete system of local government. There are several hundred village councils, elected every three years, levying taxes, distributing charities, and appointing supervisors of education.

The state revenue amounts to between $700,000 and $800,000 a year and is derived chiefly from customs, monopolies, and land tax. Austrian, Russian, and Turkish money, weights, and measures are in use.

The external trade is small. In 1905 the imports amounted to about $944,000, and the exports to $346,000; in 1911 to $1,631,000 and $478,000. The leading exports include hides, wool, horses, cattle, olive oil, and sheep. Cattle are shipped to Malta, Austria, Italy, and France. The chief imports are salt from Turkey, petroleum from Russia (both government monopolies), maize, cottons, hardware, sugar, coffee, and rice. In 1911 over half of the imports came from Austria-Hungary. The construction of a narrow-gauge railway from Antivari to Nikshich (about 100 miles) has been begun. This line will facilitate the development of iron mines. There are reported 538 miles of telegraph line.

Army. The armed forces of Montenegro constitute a true militia. Service is universal and compulsory between the ages of 18 and 62 as follows: 2 years in the training class, 33 years in the active army, 10 years in the reserve.

The active army comprises two classes: those physically fit for all field work; those suitable only for service in the transportation, supply, and sanitary units. Each year during the two years' training service the men receive three months' instruction if assigned to the artillery, two months' if to the infantry. There is no cavalry. The active army, so-called—33-year period—may be called to the colors annually for a period of 10 or 15 days. The reserves—10-year period—are assembled once a year for muster and may also be mobilized for manœuvres. Men unable to perform military duty are taxed for the support of the army in proportion to their income.

There are three infantry divisions of three brigades each, one division of two brigades. Total battalions 56, of which three are Moslems. War strength between 30,000 and 40,000 men. Annual budget about $1,250,000, of which Russia contributes $350,000.

History. Montenegro belonged in the Middle Ages to the great Servian Kingdom, but after the power of the Servians was broken by the Turks in 1389 at the battle of Kossovo (q.v.) the Montenegrins under their Prince, who was of the royal blood of Servia, maintained their independence, though compelled to relinquish the plains about Scutari, with their chief fortress of Zabliak, and to confine themselves to the mountains (1485). In their warfare against the Turks the Montenegrins leaned upon Venice, mistress of the eastern coast of the Adriatic. In 1516 their last secular Prince resigned his office and transferred the government to the Vladika, or Bishop, and the secular and ecclesiastical authority was thereafter united in the Prince-Bishop. The dignity of Prince-Bishop was elective; by the side of the chief magistrate was a civil governor. The Ottoman rulers continued to assert their claims to Montenegro and included it in the Pashalic of Scutari; but the Montenegrins, in their rocky fastnesses, succeeded generally in asserting their independence, and more than once the Moslem invaders met with disaster. In 1696 the office of Vladika ceased to be elective. In that year the present reigning dynasty of Petrović-Njegoš was inaugurated in the person of Danilo Petrovič. For a century and a half the succession was from uncle to nephew, the Vladika not being permitted to marry. In 1710 the Montenegrins sought and obtained the protection of Russia, the Czar agreeing to grant them an annual subsidy, while they, on their part, agreed that the Vladika was to be consecrated by the Czar. In 1796 the Prince-Bishop Peter I defeated the Pasha of Scutari, who had invaded Montenegro, and for the next quarter of a century there were no more Turkish invasions. The Montenegrins rendered important aid to Russia at the beginning of the nineteenth century against the French in Dalmatia and took a prominent part in the attack on Ragusa and the capture of Curzola, but they were not allowed to realize their dream of becoming masters of the seaport of Cattaro. Peter II, who ruled from 1830 to 1851, made great efforts to civilize his people and improve their condition. He established the Senate, introduced schools, and endeavored, though unsuccessfully, to put an end to internal feuds and predatory expeditions into the neighboring provinces. In 1851 the last Prince-Bishop died, and his successor, Danilo I, in 1852 separated the religious from the secular supremacy, retaining the latter under the title of Gospodar, or Prince. In 1852 war broke out with the Turks, who, under Omer Pasha, invaded the country, but through the intervention of the Powers peace was arranged Feb. 15, 1853. In 1855 Danilo decreed civil and religious liberty for his subjects, and in the following year he went to the Paris Conference to obtain recognition of the independence of Montenegro, but his efforts were unavailing. On Aug. 11, 1860, he was assassinated by a Montenegrin whom he had exiled. In the first year of the reign of his nephew and successor, Prince Nicholas, the Montenegrins stirred up an insurrection against the Turkish rule in Herzegovina, which was soon suppressed, and in return they were so hard pressed by the Turks that they were glad to agree to a treaty (1862), by which the sovereignty of Turkey over Montenegro was recognized. The more serious insurrection that broke out in Bosnia and Herzegovina in 1875 caused Prince Nicholas, in conjunction with Prince Milan of Servia, to declare war against Turkey (July, 1876). As the Servians suffered reverses, an armistice was arranged in November; but with the entrance of Russia into the struggle in the following spring the Montenegrins renewed their war. By the Treaty of Berlin (1878) the European Powers recognized the independence of Montenegro with an enlarged territory, including Nikshich, Podgoritsa, and the port of Antivari, together with the seaboard district thereto appertaining. This was guarded by a restriction prohibiting Montenegro from having a navy and providing that its waters should be closed to ships of war of all nations. In 1880 the Great Powers, against the protests and armed resistance of the Turks, made over Dulcigno to Montenegro. In 1896 the bicentenary of the Petrović dynasty was commemorated, and in the same year Princess Helena, a daughter of Prince Nicholas, married the Italian prince who subsequently (1900) became King Victor Emmanuel III. In October, 1905, the Prince proclaimed the abolition of the autocratic system and summoned a popular National Assembly which met on December 19. The Prince thereupon promulgated a Liberal constitution to which he took an oath, and a regular parliamentary government with a responsible ministry was instituted. On Aug. 28, 1910, Prince Nicholas celebrated the golden jubilee of what had been on the whole a most successful and auspicious reign by assuming the title of King. The Montenegrins sympathized more or less openly with the Albanian insurrections of 1910–11 against Turkey and afforded a refuge for hard-pressed tribesmen, especially for the Christian Malissori. Repeated conflicts between Turks and Montenegrins on the border aroused a strong national desire for war, and it was not surprising that Montenegro joined with Greece, Bulgaria, and Servia in forming (March, 1912) the Balkan Alliance against Turkey. Montenegro preceded her allies in the formal declaration of hostilities by nine days (October, 1912). In the ensuing Balkan War (q.v.) the chief Montenegrin offensive was directed against Scutari, which capitulated on April 23, 1913; while a smaller Montenegrin force, in conjunction with a Servian army, occupied the seaports of Alessio and San Giovanni di Medua. Much ill feeling was engendered in Montenegro, as well as in Servia, by the high-handed diplomacy

and military threats which Austria-Hungary employed in order to establish an independent Albania and thereby to deprive Servia of part of her conquests and of any outlet on the Adriatic. A show of force was required from the Great Powers to compel Montenegro to surrender Scutari to the new Principality of Albania (May, 1913). In the second phase of the Balkan War, Montenegro joined with Servia, Greece, and Rumania against Bulgaria and, in accordance with the Treaty of Bucharest (Aug. 6, 1913), received from Servia, as compensation for assistance in the Balkan War, approximately a half of the Sanjak of Novi Bazar, including Plevlye, Byelopolye, Ipek, and Djakova. The Balkan War nearly doubled the territory and population of the mountain kingdom. This successful issue of the joint action of Montenegro and Servia against their hereditary Turkish enemy served immediately to turn the patriotic instincts of their common Serb nationality against their feared and hated Austro-Hungarian enemy. The Montenegrins had shared with the Servians the bitterest feeling for their northern neighbor ever since Austria-Hungary in 1908 had annexed the Serb provinces of Bosnia and Herzegovina—a feeling which the attitude of the Dual Monarchy during the Balkan War had not tended to alleviate. Montenegrins as well as Servians no doubt countenanced numerous plots in Bosnia against Hapsburg rule, and, following the assassination of the Austrian Archduke Franz Ferdinand at the Bosnian capital on June 28, 1914, and the outbreak of war between Austria-Hungary and Servia, Montenegro threw in her lot with Servia (Aug. 8, 1914) and thereby became a party to the great War in Europe (q.v.).

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MONTENOTTE, mŏn'tā-nôt'tā. A village in the Province of Genoa, Italy, 26 miles west of Genoa. Here, on April 12, 1796, Napoleon won his first victory over the Austrians under Argenteau.

MONTÉPIN, môn'tā'păn', Xavier Aymon, Count de (1824–1902). A French writer, born at Apremont (Haut-Saône). He studied at the Ecole des Chartes, entered journalism in 1848, founded *Le Canard*, was a contributor to the antirevolutionary *Pamphlet* and *Lampion*, and with De Calonne published two satirical pamphlets, *Les trois journées de Février* and *Le gouvernement provisoire*. He wrote almost 100 works of fiction, originally published as feuilletons in the *Petit Journal*, and more than a score of plays. His plays were frequently the result of collaboration, and in several instances were based upon his own stories. Titles of the former include: *Les chevaliers du lansquenet* (1847); *L'Officier de fortune* (1857); *Le ventriloque* (1876); *Le secret de Titan* (1883); *La policière* (1897); of the latter, *Le connétable de Bourbon* and *Tabarin* (1873), with Grangé.

MONTE PINCIO, mŏn'tā pēn'chō. See Pincian Hill.

MONTEPULCIANO, mŏn'tā-pul-chä'nō. An episcopal town in the Province of Siena, Italy, 28 miles southeast of Siena (Map: Italy, C 3). It is situated 6 miles from its railway station, at an altitude of 1970 feet. It is surrounded by mediæval ramparts, has interesting houses, palaces, churches, and a cathedral of the sixteenth century built by Bartolommeo Ammanati. It contains a monument by Michelozzo. Its institutions include a technical school, Gymnasium, and library. The chief trade is in silks and wines. Pop. (commune), 1901, 15,399; 1911, 15,994.

MONTEREAU, môn't'-rō'. A town in the Department of Seine-et-Marne, France, at the confluence of the Seine and Yonne, 49 miles southeast of Paris by rail (Map: France, N., H 4). Its chief buildings are the thirteenth-century parish church and the Château of Surville. The manufactures include porcelain, pottery, brick, tile, shoes, varnish, dyes, and agricultural machinery, and there is general commerce in agricultural produce and cattle. On the bridge across the river John the Fearless, Duke of Burgundy, was assassinated in 1419, at the instigation and in the presence of the Dauphin, afterward Charles VII; and in the immediate vicinity, on Feb. 18, 1814, Napoleon gained his last victory over the Allies, an event commemorated by a bronze equestrian statue of the conqueror, on the bridge, by Pajol. Pop., 1901, 7929; 1911, 8617.

MONTEREAU, Pierre de. See Montreuil, Pierre de.

MONTEREY, mŏn'te-rā'. A city in Monterey Co., Cal., 127 miles by rail south by east of San Francisco, on Monterey Bay, on the Southern Pacific Railroad, and on the Pacific Coast and North Pacific steamship lines (Map: California, D 6). The leading industries are farming, cattle raising, fishing, and canning. Monterey is important as a resort. It has an admirable site with beautiful surroundings, an excellent harbor, a climate remarkably mild and equable, and fine facilities for bathing. There are interesting specimens of the picturesque architecture left from the Spanish occupation. Among the many points of interest are the San Carlos and Carmel missions, the old customhouse, the famous 17-mile drive, Colton Hall, in which the convention in 1849 met to frame the state constitution, and the public library. Monterey has adopted the commission form of government. Pop., 1900, 1748; 1910, 4923.

In 1770 the Spanish established here the mission and presidio of San Carlos Borromeo de Monterey. In 1818 the place was captured by insurgents. From 1840 to 1845 it was the capital of the province. It was captured and held for a day in 1842 by Commodore Jones (U. S. N.), acting under the impression that war had broken out between Mexico and the United States. In 1846 (July 7) the American flag was raised here by Commodore Sloat, and in 1847 Monterey became the seat of the military government of California. Three years later it was incorporated as a city.

MONTEREY, Battle of. After the battles of Palo Alto and Resaca de la Palma (qq.v.), during the war between the United States and Mexico, General Taylor remained for some time at Matamoros and in September, 1846, with a force of about 6700 men proceeded against Monterey, then strongly fortified and defended by some 9000 Mexicans, of whom 3000 were regulars, under General Ampudia. On September 19 he arrived before the city and on the 21st simultaneous attacks were made by Generals Worth and Garland on the fortified heights west of the city and the redoubts on the east respectively. The former succeeded, but the latter was repulsed with considerable loss. The fighting continued on the 22d and 23d, General Worth entering from the west and driving the Mexicans before him until they reached the strongly fortified position in the middle of the city. General Ampudia then made overtures of surrender and on the 24th the terms were finally fixed—the Mexicans to march out of Monterey (Mex., Monterrey) with their small arms and accoutrements, one field battery, and 21 rounds of ammunition, seven days being allowed them to evacuate; a mutual armistice of eight weeks was agreed upon; and the munitions of war and supplies, together with the city and its fortifications, were to be left in the hands of the Americans. To many the terms granted by General Taylor have appeared too generous and even by the administration at Washington much dissatisfaction was felt. His judgment was sustained, however, by competent military men and was generally approved throughout the United States both by civilians and experts. During the three days the Americans lost more than 500 in killed and wounded, the Mexicans a very much larger number, though the exact figures have never been determined. Consult: H. O. Ladd, *The War with Mexico* (New York, 1883); O. O. Howard, *General Taylor* (ib., 1892); R. M. McElroy, *The Winning of the Far West* (ib., 1914).

MONTERO RÍOS, mŏn-tā'rō rē'ŏs, Eugenio (1832–1914). A Spanish statesman and jurisconsult, born at Santiago (Coruña) Nov. 13, 1832. He studied philosophy, law, and theology at Santiago and jurisprudence at Madrid. After holding the chair of ecclesiastical discipline at the universities of Oviedo and Santiago, and that of canon law at Madrid, he was elected (1869) Progressive deputy in the Constituent Cortes. In a brilliant polemic in *La Iberia,* against the Archbishop of Santiago, he discussed the fifth basis of the constitution of the state and proved himself one of the most learned canonists and theologians in Europe. One of the studies that most attracted public attention was a discourse read before the faculty of the University of Santiago, *El Ultramontanismo y el Cismontanismo.* In the Constituent Cortes, when the religious question was discussed, he made a sound and able defense of liberty of conscience. In 1870–72, while Minister of Justice in the cabinet of General Prim, he established civil marriage and the court of appeals in criminal cases, reformed the mortgage law, and brought about the adoption of a new penal code and the establishment of juries. Between 1885 and 1899 he held various cabinet, legislative, and high judicial offices, and in 1898 was appointed president of the Spanish Commission of Peace to treat with the United States Commission at Paris. On the death of Sagasta he became leader of the Liberals; served as president of the Council of Ministers (1905); and was again president of the Senate (1910). Chambers of commerce in Spain owe their establishment to him. Montero Ríos died at Madrid, May 12, 1914.

MONTE ROSA, mŏn'tā rō'zȧ. Next to Mont Blanc the highest peak in the Alps. It is situated on the boundary between Italy (Piedmont) and the Swiss Canton of Valais, where the Pennine and the Lepontine Alps meet (Map: Italy, A 1). It has eight principal peaks, all exceeding 13,000 feet in height, and the highest, the Dufour Spitze, attaining an altitude of 15,217 feet, 564 feet less than that of Mont Blanc. It is covered with glaciers on all sides and has an abrupt, almost precipitous slope on the east, while on the west the great Gorner Glacier slopes more gradually towards the base of the Matterhorn. The main structure of the mountain is gneiss, while the upper parts consist of mica slate. Iron, copper, and gold are found and several mines are worked, one at an altitude of 11,000 feet. The passes over the chain near Monte Rosa are among the loftiest and most difficult in the Alps, and the peak itself is very difficult of ascent. The climbing of this mountain was first accomplished by the Smith brothers in 1855.

MONTERREY, mŏn'tā-rā'. The capital of the State of Nuevo León, Mexico, situated 1600 feet above sea level, 160 miles west of Matamoros (Map: Mexico, J 5). It is a handsome city with well-paved and clean streets and is surrounded by beautiful gardens and orchards. The town has a fine cathedral and government buildings, and among its educational institutions are schools of law and medicine and a theological seminary. It is an important railroad centre and is second only to Mexico City in commercial activity, carrying on an extensive trade with the United States. Its industries include large smelters, an electric-light and power plant, a foundry, breweries, ice factories, and flour mills. Silver mining and agriculture are carried on in the surrounding region. Much American capital is invested in Monterrey, which is the seat of a United States consul. Pop., 1895, 45,695; 1910, 78,528. Monterrey was founded under the name of León in 1581 and received its present name in 1599. See Monterey, Battle of.

MONTES, mŏn'tȧs, Ismael (c.1856–). A Bolivian statesman and President. He was educated for the law in the University of La Paz, but in 1879 entered the army, serving with distinction in the war against Chile. Afterward he practiced law, reached the rank of colonel in the army, and in 1903 became acting Minister of War. During the insurrection of the Brazilians in the Acre region, in this latter year, Montes again distinguished himself as a military leader. In 1904 he was elected to the presidency, and because of the death of his successor, Dr. Guachalla, in 1908, before his inauguration, Montes continued in office a year beyond the regular term, pending a new election. Under his able administration the country made rapid progress along economic lines, especially in the extension of the railway system. In 1910 Montes was appointed Minister to England, and while in Europe he negotiated new loans under favorable conditions for Bolivia. He was reelected President in 1913 and continued his energetic efforts to better the financial and

economic conditions of the country. The principal achievement of his second term was the passage of a law providing for much needed reforms in the banking system (1914).

MONTESA, mŏn-tā′sȧ, Order of our Lady of. An order founded in 1317 by James II of Aragon to take the place of the Templars after their dissolution. The city and castle of Montesa in Valencia were given to it and it was endowed with the property formerly belonging to the Templars. It acknowledged the Order of Calatrava as its superior. In 1587 it was united with the Spanish crown and is now a court order with two classes.

MONTE SAN GIULIANO, mŏn′tȧ sȧn jōō-lyä′nō. An episcopal town in the Province of Trapani, Sicily, situated on a mountain 2450 feet above the sea, 4 miles northeast of the town of Trapani. On the mountain (anciently Eryx, q.v.) are the remains of a famous temple of Venus, also a spring dedicated to the goddess. The town has a fourteenth-century church and remains of numerous ancient buildings. There are oil works and marble pits. Pop. (commune), 1901, 28,939; 1911, 28,663.

MONTESANO, mŏn′tē-sä′nō. A city and the county seat of Gray's Harbor Co., Wash., 48 miles by rail west by south of Olympia, at the head of tide-water navigation on the Chehalis River, and on the Chicago, Milwaukee, and St. Paul and the Northern Pacific railroads (Map: Washington, B 4). It is in a lumbering, dairying, and farming district and has salmon fisheries, a creamery, and manufactories of incubators and brooders, shingles, sash and doors, etc. There is a salmon hatchery on the Chehalis River, 3 miles above the town. Montesano contains splendid courthouse and city hall buildings. Pop., 1900, 1194; 1910, 2488.

MONTE SANT' ANGELO, mŏn′tȧ sänt än′jȧ-lō. A town in the Province of Foggia, Italy, situated near the Gulf of Manfredonia, 27 miles northeast of Foggia, on one of the Gargano mountains, 2765 feet above sea level (Map: Italy, E 4). The grotto church of St. Michael is visited yearly by many pilgrims, particularly during the festival season in May. It contains fine tombs and sculptures. Pop. (commune), 1901, 21,870; 1911, 23,012.

MONTESES, mŏn-tēs′ēs. A general term often applied to the pagan tribes of the southern Philippines. In a more limited way it is used to designate the dwellers in the interior of Panay and Negros islands. These people represent the conservative element of the Visaya, who refused Spanish rule and Christianity and retired to the mountains. See Philippine Islands.

MONTESINOS, mōn′tȧ-sē′nōs, Fernando (c.1593–c.1655). A Spanish historian. In his youth he went to Peru and eventually became a member of the Supreme Administrative Council at Lima. While employed in this capacity he visited different parts of Peru, studying Peruvian history. The fruits of his archæological research appeared in two historical works, the *Anales Nuevas del Perú* and the *Memorias antiguas historiales del Perú*, which was translated into French and published in Paris, 1840, as volume xvii of Henri Ternaux-Compans's *Voyages, relations, et mémoires originaux*, under the title *Mémoires historiques sur l'ancien Pérou*. This latter work is now most easily consulted in the edition published in the *Colección de libros españoles raros ó curiosos*, vol. xvi, under the title *Memorias antiguas historiales y políticas del Perú*, edited by Marcos Jiménez de la Espada (Madrid, 1882).

MONTESPAN, mōn′t′-spän′, Françoise Athénaïs de Rochechouart de Mortemart, Marquise de (1641–1707). Mistress of Louis XIV. She was born at the Château of Tonnay-Charente, the second daughter of the Duke of Mortemart. She was the wittiest and most beautiful member of a family renowned for its wit and beauty, and soon became the most popular of the Queen's ladies in waiting at Versailles. She married the Marquis de Montespan in 1663. In 1668 she became the King's mistress, sharing her power for some years with La Vallière (q.v.), whom she finally supplanted. Till 1679 she ruled the King and the court, dictated matters of policy, and was uncrowned Queen of France. From that time on she was gradually supplanted in the King's affections by Madame de Maintenon, whom she had hired as governess for the children she had borne the King. She left court about 1687, wandered disconsolately over France, and finally found peace in a convent. Of her children by the King the best known were the Duke de Maine, the Count de Toulouse, Mademoiselle de Nantes, and Mademoiselle de Blois, who married the subsequent Regent Orléans.

MONTESQUIEU, mōn′t′-skyē, Charles de Secondat, Baron de la Brède et de (1689–1755). One of the most celebrated politico-philosophical writers of France. He was born Jan. 18, 1689, at his father's Château of Brède, near Bordeaux, of a distinguished family of lawyers. He was a brilliant, versatile scholar, illuminating solid legal attainments by an ardent love of classics and science. In 1714 he was appointed a councilor of the Parlement of Bordeaux, and two years later, president of the Parlement. He cared nothing, however, for the routine of legal practice or for the requirements of official duty, and as his fortune was ample he was enabled to gratify his taste for study, travel, and observation without hindrance. His first published work was the famous *Lettres persanes* (1721), in which he ridicules, with exquisite humor and perspicuous criticism, the religious, political, social, and literary life of his countrymen, a proceeding involving some risk of persecution but for his device of placing his comments in the mouths of two Persians of distinction supposed to be traveling in Europe. Although he did not spare the Academy in these letters, he was made a member of it in 1728. In 1726 Montesquieu resigned his office in the Parlement of Bordeaux and spent some years in foreign countries. A two years' sojourn in England, in the course of which he moved in influential circles and had an opportunity to observe English political conditions, made him an admirer of the English political system, which inspired his greatest work, *L'Esprit des lois*. After his return to France he published his *Considérations sur les causes de la grandeur et de la décadence des Romains* (1734), a masterly review of Roman history. It was followed after a long interval by his *Dialogues de Sylla et d'Eucrate, et de Lysimaque* (1748), published under an assumed name, in which the motives and feelings of a despot are skillfully analyzed. In the same year appeared his great work, on which he had been engaged for 20 years, the *Esprit des lois*, in which he attempted to discover the relation between the laws of different

countries and their local and social circumstances. The book proved immensely popular.

The *Esprit des lois* is one of the classics of political science, one of the path-breaking works in establishing the science of politics upon an historical rather than an a priori basis. It has assured Montesquieu a place among the foremost political philosophers of all times. Without adopting Voltaire's hypereulogistic criticism, that "when the human race had lost their charters, Montesquieu rediscovered and restored them," it may be said that it was the first work in modern times in which the questions of civil liberty were ever treated in an enlightened and systematic manner. The *Esprit des lois*, next to Locke's *Essay on Government*, was probably the political work best known to the statesmen of the American Revolution and early constitutional period, and its influence was marked in the discussions attending the adoption of the Constitution. It was bitterly attacked in Montesquieu's own day for its radical attitude in regard to the Church and religion and for its alleged Anglomania, but it was admired by the reform party in France and by the Moderates of the French Revolution, though not popular in France in later days. It is divided into 31 parts. The first eight deal with laws in general, their nature and principles; the next five with laws relating to offense and defense, political liberty, and taxation; the next twelve with laws in relation to climate, soil, manners and customs, commerce, population, and religion; the twenty-sixth deals with laws in their relation to the affairs which they determine; the remaining five books, relating to Roman, French, and feudal law, are a kind of historical supplement. The collective editions of his works are numerous. The best is that of Laboulaye in seven volumes (Paris, 1875–79). All of his important works have been translated in numerous editions. The best short work on Montesquieu is Sorel, *Montesquieu*, translated by Masson (London, 1887); the standard authority is Vian, *Histoire de la vie et des œuvres de Montesquieu* (Paris, 1879). There are good essays by Doumic, Brunetière, and Zevort. Consult also: E. J. Lowell, *Eve of the French Revolution* (Boston, 1893); C. P. Ilbert, *Montesquieu* (Oxford, 1904); E. P. Dargan, *Æsthetic Doctrine of Montesquieu* (Baltimore, 1907). A complete bibliography of the literature dealing with Montesquieu has been published by L. Dangeau (Paris, 1874).

MONTESQUIOU, Robert, Count de (1855–1921). A French poet and essayist, born in Paris. His first verse, in the volume *Les chauves-souris* (1892, new ed., 1907), attracted much attention because of its unusual form, imaginative quality, and a certain fastidiousness of language, characteristic of all his writings. His poetical works include: *Le chef des odeurs suaves* (1894; new ed., 1907); *Le parcours du rêve au souvenir* (1895; new ed., 1908); *Les hortensias bleus* (1896); *Les perles rouges* (1899); *Les paons* (1901; new ed., 1908); *Prières pour tous* (1901). He also became well known as a "conférencier du salon," and in this capacity he visited the United States in 1903. His other writings include: *Roseaux pensants* (1897); *Autels privilégiés* (1899); *Professionnelles beautés* (1905); *Altesses sérénissimes* (1907); *Passiflora* (1907); *Assemblée de notables* (1909); *La petite mademoiselle* (1911); *L'Inextricable graveur Rodolphe Bresdin* (1913).

MONTESSORI, mŏn'tĕs-sō'rē, Maria (1870–). An Italian educator. She studied medicine at the University of Rome and was the first woman in Italy to secure the degree of Doctor of Medicine (1894). Her interest in education came through her experience as assistant doctor at the psychiatry clinic of the university. Here she became interested in the training of feeble-minded children, a subject on which she read a paper at the Pedagogic Congress at Turin in 1898. At the request of Signor Barcelli, then Minister of Education, she delivered a series of lectures to teachers in Rome, which led to the establishment of the Orthophrenic School for feeble-minded children. As principal of this school (1898–1900) she put into practice the ideas of Itard and Séguin (q.v.). The success of her work with idiots led her to turn her attention to the education of normal children. As a preparation for this work she returned to the University of Rome to study experimental psychology and at the same time to investigate the prevailing practices of the ordinary schools. The opportunity of putting her theories into practice offered itself in 1907 when the proposal was made to establish a school in connection with the tenements erected by the Roman Association for Good Building for working-class tenants. The first House of Childhood (Casa dei Bambini) was opened in January, 1907, and was soon followed by others. Dr. Montessori maintained her connection with these schools until 1911, when she turned her attention to experiments for extending her methods and applying them to older children. Her work attracted wide attention among laymen as well as among professional educators. She has set forth her principles in two works, *Antropologia pedagogica* (Eng. trans. by F. T. Cooper, *Pedagogic Anthropology*, New York, 1913) and *Il metodo della pedagogia scientifica applicato all' educazione infantile nelle case dei Bambini* (Eng. trans. by Anne E. George, *The Montessori Method*, New York, 1912). For bibliography see under Montessori System.

MONTESSORI SYSTEM. An educational experiment conducted in Rome by Dr. Maria Montessori (q.v.), which attracted considerable attention throughout the world between 1910 and 1912. It is difficult to estimate its value at this stage. To some educationalists it is the greatest educational advance since Fröbel; by others it is regarded merely as a restatement of the educational theory of the Rousseau-Pestalozzi-Fröbel group, with a few additions which in themselves are not of great value. For several reasons the work aroused the greatest interest in Europe and America; it came at a moment when the educational world had reached a transition period and was ready to take a step forward; the experiment in itself met with great success in the particular situation with which Dr. Montessori had to cope; finally, it has received not a little purely commercial advertising. In a very short period the movement has inspired a considerable body of literature, both popular and professional.

Dr. Montessori approached the task of educating normal children after a successful application of the principles of Itard and Séguin to the education of defective and feeble-minded. Success in this field led her to inquire into the reasons for the comparative retardation of normal pupils in the ordinary schools taught by the usual methods of instruction. After de-

voting herself to the study of experimental psychology and the observation of children she concluded that the traditional school methods were calculated to repress the pupils mentally, to insist on their passive obedience, to restrict their spontaneous activities, and to superimpose the will of the teacher on their individuality. In this way she arrived at the central principle of her system, which has perhaps attracted more attention than any other and as a restatement of an old doctrine is of more permanent value. This principle is the doctrine that the pupils should be allowed freedom to unfold themselves, that the liberty of the pupils in their spontaneous manifestations "should be encouraged, and that such liberty and spontaneity could only be attained by auto-education." The teacher in such a system ceases to be a dictator and becomes a supervisor and guide; the pupils have no other incentive to work than the joy of work without the stimulus of rewards and punishments; the impelling force comes from within and is no longer imposed from without; and concentration on attractive occupations leads to self-control without the intervention of restrictive discipline. Students of the development of the theory of education in the last century will recognize that this principle is by no means revolutionary. Dr. Montessori's contribution consists largely in carrying this principle into practice. The Houses of Childhood (Case dei Bambini) are revolutionary in having none of the earmarks of the traditional school; there are no time-tables, no prescribed lessons, and no classes. Each child is an individual and as such follows his own inclination, the function of the teacher being to put occupations in his way. The traditional restrictions in the form of fixed school furniture are removed and are replaced by light furniture that the children can easily move about. Practically the only formal lessons employed consist of a little physical exercise and marching. Dr. Montessori insists that the failure of the traditional school has been due to preconceived theory and philosophy; she claims to have no philosophy and to base her work entirely on scientific experimentation and methods. And, yet, although anthropological measurements and teachers' observations of the pupils are recorded, no known application of these appears to be made.

The second fundamental principle, which after all must be regarded as the outcome of a philosophy of education, is the emphasis on the training of the senses and muscles in the early stages of development. The aim is not, as it has been with other educational theorists, the imparting of knowledge on information through the senses, but "the refinement of differential perceptions of stimuli by means of repeated exercises." Here are introduced the occupations which furnish opportunities for auto-education. For this purpose there has been invented the "didactic apparatus," which consists of 26 items for the training of all the senses except taste and smell. The child using these items educates itself because "the didactic material contains within itself the control of error," since only one thing and that alone can be done with each piece. Among these general senses to be trained are the tactile, thermic, baric, stereognostic, visual, and chromatic. The apparatus for the training of these is supplemented by games, e.g., blindfold games for developing the sense of touch, and games in the dark for the sense of hearing and discrimination of sounds. The exercises were found to be valuable in the training of defectives, but it is questionable whether they are of equal service in the education of the normal child. So much that is claimed for this work is based on the discarded theory of formal discipline that there is here evidence that the inventor's study of psychology did not carry her very far. Another criticism is that the apparatus is in fact restrictive and does not afford adequate expression for many of the child activities. Indeed, while desiring to avoid "preconceptions," Dr. Montessori, although claiming here to be scientific, is in reality imposing an invention of her own. It must be noted that the apparatus differs from the Fröbelian gifts; it is not intended to afford opportunities for play activities but for intellectual growth alone. For Dr. Montessori does not favor play and has been quoted as saying, "If I were persuaded that children needed to play, I would provide the proper apparatus; but I am not so persuaded."

But while the didactic materials appear to be somewhat remote from practical life and processes they are supplemented by activities of practical life. Since the children in the Houses of Childhood remain at school all day opportunity is offered in training them to dress, to be of service to others, to serve meals, to wash dishes, and to be neat and clean. They are taught to dress themselves by learning how to button, lace, hook, and clasp articles of dress by the use of special apparatus consisting of light wooden frames to which are attached materials with which to perform the appropriate processes.

The features in the Montessori system that have attracted the greatest popular attention are perhaps those to which Dr. Montessori attaches least value. These are the methods of instruction in the formal studies, especially writing and reading. The sense and muscular training developed by the apparatus is made the basis of the writing lessons. The pupils learn to recognize the symbols by the use of sandpaper letters mounted on cardboard, by means of which they "establish the visual-muscular image of the alphabetical signs"; after learning the shape and contour of the letters they are trained to pick out the letters and to pronounce the sounds; lastly comes the composition of words. The muscular control is further trained by exercises for outlining and filling in geometrical figures with chalk. All the acts necessary for writing are thus mastered before actual writing is begun; after this preparation the pupil "explodes into writing," and in a period varying according to age from one to three months rapidly attains an ability that is not secured by the ordinary school methods in as many years. While this must be recognized as a great contribution, further experimentation is necessary before its value for teaching a language not so phonetic as the Italian has been proved. The methods of teaching reading and arithmetic do not contain anything of special value, or that has not been practiced before in some form or other.

Probably some more years of experimentation and observation of the results of the system must elapse before a true estimate of the Montessori doctrines can be formed. Attempts are already being made to adapt the principles, applied up to the present mainly to children between three and seven years of age, to higher

classes. Montessori schools have been established all over the world, mainly through private effort, but in Switzerland they have been established publicly by a law of 1911. Of undoubted value is the renewed emphasis on the doctrine of liberty of the pupil, which Dr. Montessori carries out more logically than did Fröbel in his kindergarten. In line with contemporary theory, too, is the insistence on scientific experiment in education rather than empiricism or preconceptions or obscurantism. But Dr. Montessori here does not seem well informed on what has already been done in scientific education or in the practice of kindergartens and infant schools. Valuable also is her contribution on the method of teaching writing. The chief criticism that may be brought against the system is its neglect of practical life activities; it is true that to a slight extent they find a place in her work, but only to a slight extent. Those activities usually associated with child life—plays and songs and stories, the constructive and inventive activities, the development of the imagination—find no place in the scheme. As compared with the attempts of John Dewey to carry into practice the doctrine of freedom and self-activity, the Montessori system fails just because Dr. Montessori's conception of education is much narrower than life and because in place of life activities she provides only a set of mechanically simple devices. But the contribution of the system will have been effective if it does nothing more than stimulate thought and criticism of the traditional practices.

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MONTEVERDE, mŏn'tā-vâr'dâ, or **MONTEVERDI,** -vâr'dē, CLAUDIO (1567–1643). An Italian composer, born at Cremona. He rebelled against the limited and arbitrary musical rules of his day and made valuable innovations, especially in harmony, so that his music approaches closely to our modern system of major and minor modes. He was a pioneer in the movement that led to modern opera, and the most important representative of the Florentine *stilo rappresentativo*. He improved and enlarged the orchestra, and in his operas treated the instruments with considerable freedom, thus anticipating a real instrumental style as distinct from the purely vocal style then exclusively in vogue. There are even attempts at dramatic characterization by means of instruments. From 1601 to 1612 he was maestro di cappella to the Duke of Mantua. In 1613 he was called in a similar capacity to San Marco in Venice, where he remained till his death. His works consisted in part of: *Orfeo* (1603); *Arianna* (1608); *Il combattimento di Tancredi e Clorinda* (1624); *Proserpina rapita* (1630); *Adone* (1639): *Le nozze di Enea con Lavinia* (1641); *Il ritorno d'Ulisse in patria* (1642); songs, motets, church music, and vespers. Consult: Emil Vogel, "Monteverde," in *Vierteljahrsschrift für Musikwissenschaft* (Leipzig, 1889), and Rafael Mitjana, *Claudio Monteverde y los orígenes de la ópera italiana* (Malaga, 1911). See OPERA.

MONTEVERDE, GIULIO (1837–). An Italian sculptor, born at Bistagno, Liguria. He studied at the Genoa Academy under Varni and afterward removed to Rome, where he became professor at the Academy and a leader of the naturalist movement in sculpture. His works are brilliant, but often lacking in spiritual and intellectual elevation. They include the groups "The Genius of Franklin" and "Jenner Inoculating his Child"; the equestrian statue of Victor Emmanuel at Bologna; the monument to Bellini at Catania; and a "Madonna and Child" in the Campo Santo, Genoa.

MONTEVIDEO, mŏn'tē-vĭd'ē-ō, *Sp. pron.* mōn'tā-vē-dā'ō. The capital of Uruguay, situated on the north shore of the estuary of the Río de la Plata, 68 miles east of Buenos Aires (Map: Uruguay, H 4). It is built on a peninsula running westward from the mainland and inclosing the bay forming the harbor. On the west side of the entrance to the bay, opposite the city, rises the Cerro, a picturesque mountain, in connection with which the name Montevideo is derived. The ground of the peninsula rises gradually from the water on either side to the central ridge, giving the city, besides an imposing appearance, an excellent natural drainage, which, together with its pleasant climate, good water supply, sewerage system, and general sanitary conditions, makes it a very healthful place of residence. The streets are wide, straight, and well paved, and are regularly laid out both in the new and the old quarters. The latter occupies the west end of the peninsula and is the main commercial quarter. The central portion, occupying the east end of the peninsula, contains the cathedral and the chief public buildings. From the base of the peninsula the new parts of the city spread out like a fan over the heights of the mainland, with large avenues in all directions, along nearly all of which street railway lines run to the suburbs.

The principal street is that of the Décimoctavo de Julio, which runs along the central ridge of the peninsula and terminates in the Plaza de la Independencia, the principal square of the city, surrounded by prominent buildings and colonnades. Among the other squares are the Plaza Constitucion, Plaza Zabala, and Plaza Libertad, all beautified by gardens. Many of the streets are lined with shade trees, and the Prado, outside of the city, is a handsome park and promenade. The most notable edifices include the Government Building, University, Ministry of Fomento, Exchange Building, Post Office, School of Arts and Trades, Administration of the Lottery, Municipal Building, National Penitentiary, Insane Asylum, and numerous hospitals, churches, and theatres. The chief educational institution is the university, with faculties of law, medicine, mathematics, and pharmacy. There are also a seminary, a normal school, several Catholic and foreign academies, a national museum, a public library, and a large number of public schools. Its chief industry is meat packing, the products forming a large percentage of its exports. It is the port of call for all steamship lines from Europe to the Pacific, and its location is more favorable than that of Buenos Aires for becoming the principal outlet for the products of south-central South America.

In order to improve its harbor facilities a contract was let in 1899 to a French company for dredging and the construction of breakwaters and docks, involving an expenditure of $15,000,000. When this work was completed in 1909 it did not meet the requirements of the rapidly developing trade and vessels drawing more than 20 feet were still obliged to anchor in midstream. A new project was approved in 1913 providing for further improvements and the deepening of the entrance and a part of the harbor so as to admit the largest vessels, at an estimated expense of about $25,000,000. These improvements are paid for by a tax of 3 per cent on imports and 1 per cent on exports. In 1909, 94 per cent of the imports and 71 per cent of the exports of Uruguay passed through the port of Montevideo, the total value of the imports and exports of the city being respectively $34,251,069 and $32,685,267. The principal exports are wool, hides, meat and meat extracts, animal fat, and live stock, and the imports, cotton goods, iron and steel, sugar, coal, woodwork, woolen goods, wines, machinery, and chemicals. The recent rapid development of the city has been marked by an increase in the population during the past 15 years amounting to about 40 per cent, a considerable portion of which is due to immigration. In 1803 it had a population of 13,937; in 1852, 33,994; in 1860, 57,916; in 1900, 268,334; and in 1914 (est.), 377,994. Foreigners form about one-third of the population, the chief nationalities represented being the Italian, Spanish, and Brazilian.

Montevideo owes its origin to a fort built in 1717 by the Viceroy of Buenos Aires to check the encroachments of the Portuguese. The first settlements of civilians around the fort began in 1726. Its commercial importance was not recognized until 50 years afterward. In the war of independence the Spaniards maintained possession of it until 1814. In 1828 it was made the capital of the new Republic of Uruguay. Between 1842 and 1851 it was besieged at intervals by Oribe (q.v.), who was supported by the Argentine dictator, Rosas, and has since been disturbed by internal dissensions. Peaceful conditions during a number of years and its great natural advantages have contributed to its present state of prosperity. Consult: Bordoni, *Montevideo e la repubblica dell' Uruguay* (Milan, 1885); C. M. Maeso, *Tierra de promisión* (Montevideo, 1906); N. Estrada, *Uruguay contemporáneo* (Valencia, 1907); W. H. Koebel, *Uruguay* (New York, 1913).

MON'TEVID'EO. A city and the county seat of Chippewa Co., Minn., 134 miles by rail west of Minneapolis, at the confluence of the Minnesota and Chippewa rivers and on the Chicago, Milwaukee, and St. Paul Railroad (Map: Minnesota, B 6). It has a Carnegie library, a State high school, public hospital, and Windom College (Congregational), and attractive courthouse and city hall buildings. The industrial establishments include several grain elevators, flouring mills, canning, gate, and broom factories, and a creamery. There is in the vicinity a fine monument which marks the surrender of the Sioux chief Little Crow in the Indian outbreak of 1862. Pop., 1900, 2146; 1910, 3056.

MONTE VISTA, mŏn'tē vĭs'tȧ. A city in Rio Grande Co., Colo., 150 miles west of Pueblo, on the Denver and Rio Grande and the San Luis Central railroads (Map: Colorado, C 4). It contains the State Soldiers and Sailors Home. Monte Vista has extensive stock-raising interests and a large sugar refinery. The surrounding country is well irrigated and adapted to the growing of alfalfa, grains, potatoes, and sugar beets. Pop., 1900, 556; 1910, 2544.

MONTEZ, mŏn'tĕz, LOLA (?1818–1861). The assumed name of Maria Dolores Eliza Rosanna Gilbert, an adventuress, born in Ireland, in 1818 according to some, in 1824 according to her own statement. When very young she married a Captain James, followed him to India, grew weary of him and came back to Europe. She appeared as a danseuse in nearly all the continental capitals, and attracted a fair amount of notoriety by her beauty and escapades. In 1847 she became the mistress of King Louis I of Bavaria, who made her Countess of Landsfeld and allowed her to have considerable influence in the government. An insurrection in 1848 drove the King from his throne and Lola from Munich. She went to London, married George Heald, a guardsman, was divorced from him quickly, and came to America in 1851. She traveled over the country, acting in a play entitled *Lola Montez in Bavaria*, married a number of times, lectured, published books, and finally settled in New York, devoting herself to rescue work. Her writings comprise *The Arts of Beauty* and *Lectures* (1858), the latter containing an autobiography.

MON'TEZU'MA. A town and the county seat of Poweshiek Co., Ia., 72 miles east of Des Moines, on the Minneapolis and St. Louis and the Chicago, Rock Island, and Pacific railroads (Map: Iowa, E 3). There are considerable manufacturing interests, and it has a foundry and machine shop, a creamery, and manufactories of cement block, etc. There are deposits of coal in the adjacent region, which is engaged chiefly in agriculture, stock raising, and dairying. The water works are owned by the town. Pop., 1900, 1210; 1910, 1172.

MONTEZUMA, mŏn'tē-zōō'mȧ, or **MOTECUHZOMA (I),** ILLHUICAMINA (?1390–1469). An Aztec warrior and Emperor of Mexico, the son of Huizilihuitl. He acquired great fame as a leader of expeditions against the neighboring nations during the reigns of his father, uncle, and brother, and assisted in the formation of the confederacy of Tezcuco, Mexico, and Tlacopan in 1423. His efficient services in the war against the Tepanecs during the reign of Izcoatl gained for him the election to the throne in 1440, and his coronation took place amidst splendid festivities accompanied by human sacrifices of captives taken in war. After his succession he began war upon the Chalcas, reducing them to subjection, but was compelled repeatedly to crush out revolts of this nation. He also undertook other conquests which extended the Mexican power to the Gulf of Mexico and the Pacific Ocean. He built temples, enlarged and beautified the city of Mexico, and began a vast system of dams for the protection of the city against inundations. During his reign the country suffered a six years' famine, nevertheless he left it in a most flourishing condition. Consult E. K. Kingsborough, *Antiquities of Mexico*, vol. ix (London, 1848), and H. H. Bancroft, *Native Races* (San Francisco, 1874–82).

MONTEZUMA (II), XOCOYOTZIN (1466–1520). The last Aztec ruler and Emperor of Mexico. The fact that he was an able general and a priest of the temple of the war god Huitzilopochtli brought about his election to the throne in 1503 and he was crowned amidst

festivities and human sacrifices. He was of a haughty character and readily espoused the cause of the ancient nobility against the more recently created nobles. Furthermore, his despotic rule and oppressive taxation served to alienate the merchants and poorer classes. During his reign he was occupied with expeditions of conquest, suppression of revolts, erection of temples, and extensive immolations of human victims. He undertook many campaigns against Tlascala, but never succeeded in subjecting this nation to Mexico. Better success attended his efforts towards the south, where he extended the rule of Mexico to Honduras and Nicaragua. His reign was full of signs and omens which were interpreted as indicating the end of the Aztec power, and the arrival of Cortés and the Spaniards was considered as the fulfillment of the national tradition that Quetzalcoatl, a tribal divinity or hero, would return from the rising sun, white in color and bearded. This caused Montezuma to pursue a weak and vacillating course, although he endeavored by diplomacy and rich presents to prevent the Spaniards from coming to Mexico City. He met the invaders outside the city with more gifts and made no resistance to their entry (Nov. 8, 1519). He was soon made a prisoner by Cortés, and the loss of leadership paralyzed the natives and allowed the Spaniards to make their position secure. The Mexicans, refusing longer to endure the actions of the Spaniards, revolted under the leadership of Cuitlahuatzin, Montezuma's brother. In the hope of quelling the uprising Cortés induced Montezuma to address the natives from the roof of the house occupied by the invaders, but the only result was that the subjects showered their sovereign with stones and arrows. Montezuma died a few days later, either from his wounds or at the hands of the Spaniards who now knew him to be of no further use to their cause. (See CORTES, HERNANDO.) Consult Kingsborough, *Antiquities of Mexico*, vol. ix (London, 1848), and H. H. Bancroft, *Native Races* (San Francisco, 1874–82).

MONTFAUCON, môn'fô'kôn', BERNARD DE (1655–1741). A French scholar and antiquary. He was born at the castle of Soulage in Languedoc, entered the army about 1672 and served in Germany under Turenne, but after a serious illness and in pursuance of a vow he entered the Benedictine Order (1676) at the abbey of La Daurade in Toulouse. He went to Paris in 1687 to share in the translation into Latin of the Greek church fathers and in the great Benedictine patrology, and spent three years (1698–1701) in research in Italy. The years from 1701 until his death he spent in the abbey of Saint-Germain-des-Prés. Among his works are: *Diarium Italicum* (1702); *Palæographia Græca* (1708); *L'Antiquité expliquée et représentée en figures* (1719–24); and editions of Athanasius (1698), of Origen's *Hexapla* (1713), and of John Chrysostom (1718–34). See also CANON ALEXANDRINUS. Consult De Broglie, "La Société de Saint-Germain-des-Près au XVIIIe siècle," in *Bernard de Montfaucon et les Bernardins* (Paris, 1891).

MONTFERRAT, môn'fe-rä' (It. *Monferrato*). Formerly an independent duchy of Italy, bounded by the territory of Genoa, the Po, and the Maritime Alps. It was divided into upper and lower Montferrat, the former including the cities of Mondovi, Acqui, and Alba; the latter, Alessandria, Asti, and Casale. The capital was Casale. Montferrat, after the disruption of the Frankish Empire, was ruled by its own margraves or marquises till the beginning of the fourteenth century. This house for a long time disputed the sovereignty of Piedmont with the rulers of Savoy. Some of its members, notably Boniface II (q.v.), became celebrated in connection with the Crusades. On the death of Marquis John I, in 1305, the second son of his sister, Iolande or Irene, who was Empress of Constantinople, succeeded to Montferrat, becoming the founder of the family of Montferrat-Palæologus, which became extinct in 1533. Montferrat passed in 1536 to the Gonzagas of Mantua, for whom it was erected into a duchy. In 1631 the dukes of Savoy obtained possession of a portion of Montferrat, and in 1703, with the consent of the German Emperor, Leopold I, the remaining portion passed under their sway, and was incorporated with their dominions.

MONTFERRAT, BONIFACE, COUNT OF (?–1207). An Italian soldier and Crusader. He participated in the war against Saladin and was taken prisoner at Hittin (1187). In 1201 he joined the Fourth Crusade and after the death of Theobald of Champagne was chosen its leader. He became ruler of Macedonia and Greece, under the title of King of Thessalonica, in 1204. He was killed near Mosynopolis in a battle with the Bulgarian invaders.

MONTFERRAT, MARGRAVE OF. See BONIFACE III.

MONTFORT, môn'fôr' (MONTFORT L'AMAURI). The name of a noble French house, descended from the early counts of Hainault. It took its name from a castle on a "strong mount" between Paris and Chartres. The first member of importance was Simon III, Count of Montfort l'Amauri and Evreux, who married Amicia, daughter of Robert of Beaumont, third Earl of Leicester. His second son was the famous Simon de Montfort, Count of Toulouse. This nobleman, so conspicuous in the crusade against the Albigenses (q.v.), was born about the year 1160. In 1198 he went to Palestine at the head of a troop of French knights, but failed to accomplish anything against the Saracens and was obliged to return. In 1202 he joined the Fourth Crusade, which, however, was soon diverted from its purpose (see CRUSADE), in consequence of which Montfort abandoned it and went to the Holy Land, where he did some fighting against the infidels. In 1209 he engaged in the war against the Albigenses and signalized himself by his relentless ferocity and his brilliant successes. He was invested with the territories of the leader of the Albigenses, Count Raymond VI of Toulouse. He was killed by a stone at the siege of Toulouse, June 25, 1218. His son Amauri continued the struggle, lost nearly his whole patrimony, but was recompensed by Louis VIII, who made him Constable of France. He died about 1241. The brother of Amauri was the Simon de Montfort (q.v.) famous in English history. Consult Celestin Donais, *La soumission de la vicomté de Carcasonne par Simon de Montfort* (Paris, 1884).

MONT'FORT, SIMON DE, EARL OF LEICESTER (c.1208–65). A famous English statesman. He was the third son of Simon de Montfort (see MONTFORT), the leader in the crusade against the Albigenses, and was born in France. He inherited the title of Earl of Leicester from his grandmother, Amicia de Beaumont, sister and heiress of Robert, Earl of Leicester. In 1231

Simon received the lands which his father had held, his elder brother Amauri having resigned his claim to them. In 1238 he married Eleanor, sister of King Henry III and the youthful widow of the Earl of Pembroke. In 1248 he was sent by the King to undertake the command in Gascony. He held this office until 1252, amid constant revolts; was charged with having governed badly, and quarreled frequently with the King; but he was supported by the nobles in England. After his resignation Henry III was soon compelled to ask his aid. It is probable that he was a stern, ruthless, but not an unjust governor. In 1258 the King's debts were so great and the rapacity of his foreign relatives so unbearable that the people were in a state of insurrection. The barons assembled and under the direction of Montfort held the celebrated Parliament at Oxford. They passed statutes to enforce the provisions of Magna Charta, and from this resulted the Provisions of Oxford (q.v.) and a little later followed the Provisions of Westminster (q.v.). The King swore to observe them, but sent forthwith to the Pope praying to be absolved from his oath. The bull of absolution arrived. Henry set his barons at defiance, and finally both sides agreed to submit the matter in dispute to Louis IX of France, and he rendered a decision, on Jan. 23, 1264, which upheld Henry III in all points. (See MISE OF AMIENS.) The nobles, however, would not accept the decision and took up arms. They were aided by the whole middle class, who looked up to Montfort as their champion and leader, and the war began with the battle of Northampton. At Lewes (1264), the royal forces were signally discomfited and the King taken captive. The conditions imposed upon the King were summed up in the Mise of Lewes (q.v.), and Montfort was the real ruler of the Kingdom. In summoning a Parliament for 1265 to deliberate upon the measures to be adopted at this great crisis, writs were issued to the sheriffs in 1264 by Montfort directing them to return two knights for each shire and two citizens for every borough, besides the clergy and lay barons, which is of importance in the development of the representation of the commons as an estate of the realm in Parliament. A second war broke out after the young Duke of Gloucester deserted the baronial party and joined the King. Prince Edward (afterward Edward I) encountered the barons at Evesham with a greatly superior army. When defeat was inevitable, the great leader refused to flee and fell fighting bravely (Aug. 4, 1265). The death of Montfort filled the whole land with mourning; the people bewailed their dead champion, and the Franciscans pointed to his glorified spirit in heaven, regardless of the fact that on purely political grounds he had been excommunicated from the Church in 1264. The influence of Montfort was felt after his death, and his policy, in general, was followed out by Edward I (q.v.).

Bibliography. Reinhold Pauli, *Simon de Montfort*, translated by Miss Goodwin (London, 1876); G. W. Prothero, *Simon de Montfort* (ib., 1877); Devic et Vaissète, *Histoire de Languedoc*, vol. vi (Toulouse, 1879); but especially Charles Bémont, *Simon de Montfort* (Paris, 1884); also Stubbs, *Constitutional History*, vol. ii (6th ed., Oxford, 1897); id., *Early Plantagenets* (5th ed., New York, 1901); W. H. Hutton, *Simon de Montfort and his Cause, 1251–1266* (2d ed., London, 1901); J. R. Green, *History of the English People*, vol. i (new ed., ib., 1908).

MONTGAILLARD, môn'gä'yär', MAURICE JACQUES ROQUES, COMTE DE (1761–1841). A French political adventurer, born at Montgaillard, Haute-Garonne. He served as a lieutenant of French infantry in the West Indies in 1777–83 and in 1789 was established at Paris as the secret agent of the Bourbons. He emigrated to England in 1792 and continued in the service of the Royalists. In 1796 he entered into friendly relations with Napoleon Bonaparte and subsequently was instrumental in disclosing the treason of Pichegru. For this service he received a pension of 14,000 francs (later reduced to 6000); from 1804 to 1814 he was a member of the Emperor's secret cabinet. He was one of the first to accept Louis XVIII after the Restoration. His writings include: *Etat de la France au mois de mai 1794* (1794); *Ma conduite pendant le cours de la révolution française* (1795); *De la France et de l'Europe sous le gouvernement de Bonaparte* (1804); *Mémoires politiques* (3 vols., 1805–19; new ed., 1896); *Clémence et justice* (1815); *Histoire de France depuis 1825 jusqu'à 1828* (2 vols., 1829).

MONTGOLFIER, môn'gôl'fyâ', JOSEPH MICHEL (1740–1810) and JACQUES ETIENNE (1745–99). Two French inventors, born at Vidalon-lez-Annonay in Ardèche. They were the sons of a paper manufacturer, and though Etienne studied architecture, he gave up his profession to take charge of his father's factory, as Joseph had gone into business for himself. The two brothers became interested in aëronautics (q.v.), and their fame rests upon their achievement in making the first successful balloons. For this work Louis XVI decorated Etienne with the Order of Saint-Michel, gave Joseph a pension of 1000 livres, raised their father to the nobility, and later granted the brothers 40,000 francs that they might devote their whole attention to aërial navigation. Their work was interrupted by the Revolution, and during the Reign of Terror Etienne, who had been administrator of his department, was denounced and escaped only through the devotion of his workmen. Napoleon decorated Joseph and appointed him to various offices, and the Institute in 1807 elected him a member of its section of general physics. He made several other inventions of considerable value, among them the parachute, and published *Discours sur l'aérostat* (1783); *Les voyageurs aériens* (1784); *Mémoire sur la machine aérostatique* (1784), in collaboration with his brother. Consult Turgan, *Les ballons* (Paris, 1851).

MONTGOMERIE, mônt-gŭm'e-rĭ, ALEXANDER (c.1556–c.1610). A Scottish poet. He evidently received a scholarly training and for a time held an official position at the court of James VI. Some years were spent in foreign travel. *The Cherrie and the Slae* (1597), still popular among the Scotch, gives him a conspicuous place in a period of the literature of his country which was without poetic genius. The poem lacks design, but contains many passages of homely beauty. He is also author of some sonnets and a scurrilous poem, entitled *The Flyting between Montgomery and Polwart* (1621). A collection of his works was published by Laing in 1821, and another, edited by Cranstoun for the Scottish Text Society, appeared in 1887.

MONTGOMERIE, Archibald. See Eglinton and Winton.

MONTGOM'ERY. The capital of Alabama and the county seat of Montgomery County, 180 miles by rail northeast of Mobile, on the Alabama River, at the head of navigation, and therefore one of the principal gateways to those Gulf ports nearest the Panama Canal (Map: Alabama, C 3). It is an important commercial and railroad centre, being served by the Atlantic Coast Line, the Central of Georgia, the Louisville and Nashville, the Mobile and Ohio, the Seaboard Air Line, and the Western of Alabama systems.

A large inland cotton market, its annual trade being about 500,000 bales, Montgomery is the distributing point for manufactured products throughout Alabama, northern Florida, eastern Mississippi, and southwest Georgia. There are 52 wholesale houses and 110 manufacturing concerns, including sirup factories, boiler and cooperage plants, fertilizer, show-case, confectionery, barrel, and cracker factories, marble works, railroad repair shops, carriage and wagon works, and foundries and machine shops, besides a number of mills devoted to the cotton industry. Owing to the city's accessibility to timber, and deposits of coal and iron, its industries have achieved considerable importance.

The city is built on the high river bank and has many spacious old-fashioned residences and large gardens. Its principal buildings are the State capitol, Federal building, city hall, courthouse, Pythian and Masonic temples, and the Carnegie library. Montgomery has done much to further the cultural life of its people. In the past 10 years group societies have grown rapidly; patriotic organizations and women's clubs abound; and there are a number of educational institutions, including the Woman's College of Alabama, occupying a campus of 50 acres, excellent grade schools, a fine new high school, a State normal school for colored pupils, musical studios, and several libraries. There are also more than 50 acres of public parks. Among the charitable institutions are the city infirmary, St. Margaret's Hospital, an orphanage, and a home for widows.

Montgomery has adopted the commission form of government, the municipal powers being vested in a commission of three members, who are elected by popular vote and who choose their own president. All departments, with the exception of that of education, are under the control of these men. The water works are owned and operated by the city, having been acquired in 1898. In the year 1914–15 Montgomery's receipts amounted to $1,230,000, while its payments were $1,305,000, the chief items of expenditure being $102,000 for education, $56,000 for police, $57,000 for fire, $57,000 for public health and sanitation, and $58,000 for the water works. The city's assessed valuation (1915) is about $25,000,000.

When De Soto explored the Alabama River, as early as 1540, he discovered an Indian village 3 miles below the site of the present city of Montgomery; but it was not until 1817 that white settlers began to build their cabins on the bluffs of the river, and Montgomery was founded as New Philadelphia. In 1819, with a population of 600, it was consolidated with East Alabama Town as Montgomery. Incorporated in 1837, it supplanted Tuscaloosa as the State capital in 1847. The famous Alabama Platform was adopted here Feb. 14, 1848, and Montgomery was the seat of the Confederate government from February to May, 1861. It was occupied by the Union army, April 12, 1865. Pop., 1900, 30,346; 1910, 38,136; 1914, 41,777; 1920, 43,464. Consult L. P. Powell (ed.), in *Historic Towns of the Southern States* (New York, 1900).

MONTGOMERY, Florence (1843–). An English novelist of Irish parentage. Her most popular books are for children or child lovers. They include: *A Very Simple Story* (1866); *Peggy and Other Tales* (1868); *Misunderstood* (1869); *Thrown Together* (1872); *Thwarted* (1873); *Wild Mike and his Victim* (1874); *Seaforth* (1878); *The Blue Veil* (1883); *Transformed* (1886); *The Fisherman's Daughter* (1888); *Colonel Norton* (1895); *Tony* (1897); *Prejudged* (1900); *An Unshared Secret and Other Stories* (1903); *Cats and Kitts* (1910); *Behind the Scenes in a Schoolroom* (1914).

MONTGOMERY, Fort. See Fort Montgomery.

MONTGOMERY, Gabriel, Count de (c.1530–'74). A French knight of Scottish extraction. He was an officer in the Scottish Life Guard of the King of France, and in a tournament held June 29, 1559, accidentally inflicted a mortal wound on Henry II. Montgomery, although blameless, fled to Normandy, where he embraced Protestantism. On the commencement of the religious wars in 1562 he supported the Protestant cause and defended Rouen with great bravery. In the third civil war he was one of the leaders of the Protestants and gained many advantages over the Royalists in Languedoc and Béarn. During the Massacre of St. Bartholomew he happened to be at Paris, but fled to England, owing his escape to the fleetness of his horse. In April, 1573, he vainly attempted to relieve Rochelle with a small fleet. Next year, at the head of a band of Huguenots, he landed in Normandy and commenced war there; but being compelled at last to surrender the castle of Domfront, he was carried to Paris and was beheaded.

MONTGOMERY, James (1771–1854). An English poet, the son of a Moravian preacher. He was born at Irvine, Ayrshire, Scotland, Nov. 4, 1771. At the age of seven he was sent to the Moravian settlement at Fulneck, near Leeds, to prepare for the Moravian ministry. To the annoyance of the Moravians, his leisure at school was employed in the composition of epics on King Alfred and the fall of man. In 1787 he ran away, and after four years of various employment became engaged as clerk to the editor of the Sheffield *Register*. In 1794 he started the Sheffield *Iris*, which he edited till 1825. He was twice fined and imprisoned in York Castle for libel. He afterward became a moderate Conservative, and in 1835 was granted a government pension of £150. He died at Sheffield, April 30, 1854. His principal volumes of verse are: *The Wanderer of Switzerland* (1806); *The West Indies* (1809); *The World before the Flood* (1812); *Greenland* (1819); *The Pelican Island, and Other Poems* (1826). Montgomery is now chiefly remembered for his hymns (collected in 1853), of which nearly 100 are still in use. Montgomery had little depth and drew his observations from books rather than from nature. His fame is kept up, not by lovers of literature, but by lovers of religious feeling. Consult: Holland and Everett, *Memoirs* (London, 1854–56), formidably prolix; *Life* by King (ib., 1858); *Poetical Works*, edited by their author (ib., 1841; reprint, 1881) and by Carruthers (Boston, 1860).

MONTGOMERY, John Berrien (1794–

1873). An American naval officer, born in Allentown, N. J. He entered the navy as a midshipman in 1812, served in the attack on Kingston, Canada, in November of the same year and in the capture of York in April of the following year, and for gallantry on board the *Niagara* in Perry's victory on Lake Erie, Sept. 10, 1813, received a vote of thanks and a sword from Congress. In 1815 he served in Decatur's squadron in the war with Algiers, was made a lieutenant in 1818 and commander in 1839. During the Mexican War, in command of the sloop *Portsmouth*, he took possession of various places on the coast of California, blockaded Mazatlan for some months, and, with the assistance of Captain Lavalette in the *Congress*, captured Guaymas. He was made a captain in 1853 and commanded the Pacific squadron in 1860–61, retiring in December, 1861. In 1862 he was advanced to the rank of commodore on the retired list and in 1866 to that of rear admiral.

MONTGOMERY, Richard (1736–75). An American soldier. He was born near Feltrim, Ireland, Dec. 2, 1736, and was educated at St. Andrew's College and Trinity College, Dublin. In 1756 he obtained a commission as ensign in the British army, came to America with his regiment in 1757, during the French and Indian War, and displayed personal courage and military sagacity at the siege of Louisburg and in various actions. In 1760 he was made adjutant of his regiment and in 1762 was promoted to be captain. After the conquest of Canada he took part in the expedition against Havana and Martinique, and in 1765, after being stationed in New York for two years, returned to England, where he remained until 1772, when, selling his commission, he emigrated to New York. In 1775 he represented Dutchess County in the first Provincial Convention, and in June was appointed by Congress brigadier general in the Continental army. He was second in command of the expedition sent under Gen. Philip Schuyler against Canada, but, owing to the illness of Schuyler, became the actual leader in October. He at once pressed forward and before the end of November captured successively Chambly, St. Johns, and Montreal. In the next month he joined Benedict Arnold before Quebec. On December 9 Montgomery was promoted to be major general. On December 31, shortly after midnight, the assault upon the town was attempted. Montgomery scaled the Cape Diamond bastion and, pressing forward at the head of his troops, was instantly killed by the first and only volley. The undisciplined colonial troops were then overwhelmed and a precipitate retreat ensued. Montgomery's conduct and character were eulogized in Parliament by Burke, Chatham, and even Lord North; Congress recognized his services by resolutions of respect, and by its order a monument was erected in his honor in front of St. Paul's Church, New York City, where in 1818 his remains were interred with impressive ceremonies. Consult Armstrong, *Life of Richard Montgomery*, in Jared Sparks's "American Biography" (Boston, 1834).

MONTGOMERY, Robert (1807–55). An English preacher and writer of verse. He was born in Bath, graduated at Oxford in 1833, was ordained in 1835, served as pastor at Whittington, Shropshire, and of the Church of St. Jude in Glasgow, and in 1843 became minister at Percy Chapel, St. Pancras, London, where he remained for the rest of his life. He was most widely known through his numerous poetical compositions, which were extravagantly praised by readers who, enjoying their religious tone and facile versification, overlooked their defects. Condemned by literary critics, including Macaulay, they soon lost their popularity. Editions of Montgomery's verse appeared in 1839, 1840, 1841, and 1853.

MONTGOMERY, Sir Robert (1809–87). A British administrator in India. He was born in County Donegal, Ireland, and received his education at Foyle College, Londonderry, and at Wraxall Hall School, North Wiltshire, England. He entered the Bengal civil service in 1827, was actively engaged in organizing the Punjab after the annexation of that province, and at the outbreak of the Sepoy Mutiny was the highest civil officer in its capital city, Lahore. He promptly disarmed the Sepoy garrison, and thus not only saved the Punjab from the horrors which befell the neighboring provinces, but made it a rallying point from which the British began the task of reconquest. In 1858 he became chief commissioner of Oudh and the next year Lieutenant Governor of the Punjab. In 1865 he resigned and returned to England, where he was appointed one of the council of the Secretary of State for India. Consult Dodwell and Miles, *Bengal Civil Servants* (London, 1839).

MONTGOMERY, Thomas Harrison, Jr. (1873–1912). An American zoölogist. He was born in New York City and studied at the universities of Pennsylvania (1889–91) and Berlin (Ph.D., 1894). From 1898 to 1903 he was assistant professor of zoölogy at the University of Pennsylvania and professor of biology at the Wagner Free Institute of Science, Philadelphia, where he was also director of the museum (1899–1903). He held the professorship of zoology at the University of Texas from 1903 to 1908, when he took up the same duties at the University of Pennsylvania. He is author of some 80 monographs, a memoir of his father, Thomas Harrison Montgomery (1905), and *Analysis of Racial Descent in Animals* (1906).

MONTGOM'ERYSHIRE. An inland county of North Wales, between Shropshire on the east and the Welsh counties Merioneth and Cardigan on the west (Map: England, C 4). Area, 797 square miles; largely mountainous. In the valleys on the Shropshire side good crops of wheat, oats, and barley are raised. Copper, lead, and zinc are obtained; slate and limestone are quarried. The uplands provide pasturage and cattle; sheep and the pure breed of Welsh ponies called merlins are reared. The county is watered by the Severn and the Wye and a number of other small streams. The Welsh flannel manufacture is extensively carried on. Capital, Montgomery, but the county business is carried on at Welshpool and Newton alternately. Pop., 1901, 54,900; 1911, 53,146.

MONTH (AS. *mōnaþ*, Goth. *mēnōþs*, OHG. *mānōd*, Ger. *Monat;* connected with OIr. *mí*, Lett. *mēnes*, Lat. *mensis*, Gk. *μήν, mēn*, month, Skt. *mās*, moon, month, probably from Skt. *mā*, to measure, and ultimately connected with Eng. *moon*). Originally the period of the moon's revolution round the earth. If this is reckoned from the position of the moon among the stars to her return to the same position, the period is called a *sidereal* month and averages 27 days, 7 hours, 43 minutes, 11.5 seconds in length; but if from new moon to new moon, it is longer, being on the average 29 days, 12 hours, 44 min-

utes, 2.8 seconds; this is called a *synodic* month. (See SYNODIC.) The latter period forms one of the three natural measures of the lapse of time and ranks next to the day in importance. There are several other periods used by astronomers to which the name month is applied, as the *nodical* or *draconitic* month (27 days, 5 hours, 5 minutes, 35.8 seconds), from ascending node to ascending node (see NODE); the *anomalistic* month (27 days, 13 hours, 18 minutes, 37.4 seconds), from perigee to perigee; the *tropical* month (27 days, 7 hours, 43 minutes, 4.7 seconds), from equinox to equinox; and the *solar* month, which is the twelfth part of a solar year, consisting of 30 days, 10 hours, 29 minutes, 4 seconds. Distinct from all these is the *civil* or *calendar* month, fixed by law for ordinary purposes, and consisting of a fixed number of days—from 28 to 31—according to the particular month. The calendar months, with the number of days belonging to each, are as follows:

		Days
1.	January	31
2.	February	28
	" (leap years)	29
3.	March	31
4.	April	30
5.	May	31
6.	June	30
7.	July	31
8.	August	31
9.	September	30
10.	October	31
11.	November	30
12.	December	31

The names by which the months are designated throughout Christendom were given them by the Romans. In the earliest time the number of Roman months seems to have been ten, viz.: (1) Martius, (2) Aprilis, (3) Maius, (4) Junius; the remaining six were numbered as the fifth month, sixth month, etc.—(5) Quinctilis, (6) Sextilis, (7) Septembris, (8) Octobris, (9) Novembris, (10) Decembris. The months are thought to have been lunar; but how the year was filled out is unknown. To the time of the kings is ascribed a reform according to which were added two new months, Januarius and Februarius. February had 28 days; March, May, Quinctilis, and October, 31; the rest 29. The sum is 355, being one in excess, seeing 354 days go to the lunar year. The reason for the addition, and for making months of 31 days instead of 30, as usual, is said to have been that luck lies in odd numbers; but this explanation is only the conjecture of an ancient writer. Adjustment with the sidereal year was effected by intercalating two months, respectively of 22 and 23 days, inserted after February 23, the feast of the Terminalia (and ritual conclusion of the year), added in the course of a four-year period. The odd day still was in excess; moreover, the pontifices, who were charged with the duty of making the intercalation, were, by reasons superstitious or political, often induced to neglect their task; accordingly, the Roman months were constantly varying from their proper seasonal position and required arbitrary adjustment. In the reform of Julius Cæsar (see CALENDAR) the 10 days additional required to make a true solar year were distributed among the deficient months of 29 days; two each were given to Sextilis, December, and January; one each to April, June, September, and November. Hence our present numeration. The year was made to begin with January, shortly after the winter solstice. The month Quinctilis received the name of Julius, and later Sextilis was given that of Augustus. The Roman names were adopted throughout Europe. In the French revolutionary calendar (see CALENDAR) the months received new names, which had reference to the weather, vegetation, and harvest, but these were discarded when the revolutionary calendar went out of use. As to symbolic art, the months have borrowed from the zodiacal signs. (See ZODIAC.) In poetry they have received symbolic representation chiefly on the basis of their seasonal characteristics in central and western Europe. Consult William Hone, *Everyday Book* (London, 1838), and Chambers, *Book of Days* (new ed., ib., 1906). See CALENDAR; MOON.

MONTH. In law, both solar (or calendar) and lunar months are recognized. At the early common law, where the term was not otherwise defined, it was held to mean the lunar month of 28 days, except in case of commercial paper and other mercantile obligations, when, by the custom of merchants, it was deemed to mean the calendar month of 30 or 31 days. By statute in England the term month, where it occurs in statutes, must be interpreted to mean calendar month, but this does not alter the common-law rule as to contracts and other transactions. In the United States generally the term, unless otherwise defined, is usually construed to mean a calendar month, especially in contracts and other mercantile transactions. It is so defined by statute in New York, Massachusetts, Pennsylvania, and other States. However, in the interpretation of the word where found in statutes, it seems the common-law rule still prevails in some jurisdictions. See TIME.

MONTHOLON, môn'tô'lôn', CHARLES TRISTAN, MARQUIS DE (1783–1853). A French soldier, born in Paris. He displayed great zeal on behalf of the First Consul on the 18th Brumaire in the capacity of *chef d'escadron*, served in a number of campaigns, and was severely wounded at Wagram. Napoleon made him his chamberlain in 1809. He became brigadier general in 1814 and was appointed to the chief command in the Department of Loire. On Napoleon's abdication Montholon remained in France, held aloof from the Bourbons and joined the Emperor on his return from Elba. He was present at Waterloo and accompanied Napoleon to St. Helena, continuing his devoted attentions to him till he breathed his last, and, having been named in his will as one of his trustees, spared no exertion to carry its provisions into effect. For participating in Louis Napoleon's unsuccessful coup at Boulogne in 1840 Montholon was sentenced to 20 years' imprisonment, but was pardoned in 1848. In 1849 he was a member of the Legislative Assembly. With General Gourgaud he published *Mémoires pour servir à l'histoire de France sous Napoléon, écrits à Sainte Hélène sous sa dictée* (1823). He was also the author of *Récits de la captivité de Sainte Hélène* (1847).

MONTH'S MIND. In the Roman Catholic church, the requiem mass celebrated for a deceased person a month after death, as "year's mind" was used for an anniversary mass in a similar case. In the ancient English church it meant constant prayer for a person during the month after his death.

MONTHYON, môn'tē'ôn'. An incorrect spelling of Montyon (q.v.).

MONTI, môn'tē, ACHILLE (1863–). An Italian physician. Born in Arcisate (Como), he studied medicine at Pavia (M.D., 1887) and

under Koch at the Institute for Infectious Diseases at Berlin (1891–92). He then traveled in Europe and the United States, was lecturer at Pavia, and became professor of pathology at Palermo (1895) and in 1899 at Pavia. Among his works are: *Il paesi di malaria et la preservazione dell' uomo* (1891); *La patalogia cellulare e la patologia parasitaria* (1891); *Le febri malariche, etc.* (1892); *Su gli scheletri di alcune scimmie rachitiche* (1900); *Su l' istopatologia dei canalicoli contorti del rene* (1903). He translated, with C. Golgi, *Elementi d' istologia normale dell' uoma*, from the German of S. L. Schenk (1889).

MONTI, Luigi (1830–1914). An Italian author and teacher, born at Palermo, Sicily. He participated in revolutionary outbreaks in 1848–49, and, having been exiled, went to Boston, Mass., in 1850. There he taught the Italian language, becoming a prominent figure in the life of Boston and Cambridge. He served as an instructor at Harvard in 1854–59, receiving an honorary A.M. in 1857; was United States Consul at Palermo in 1861–73; and returned to Boston to devote himself to teaching and literary work. He lectured at Lowell Institute, Boston, at Wellesley and Vassar colleges, and at Peabody Institute, Baltimore. Monti was the original of "the young Sicilian," in Longfellow's *Tales of a Wayside Inn*, and he married a daughter of Thomas William Parsons (q.v.), "the Poet" of the *Tales*. He translated Guerrazzi's *Beatrice Cenci* (1857), *Manfred* (1875), and *Isabella Orsini* (1881); and published *A Grammar of the Italian Language* (1855), *Adventures of a Consul Abroad* (1878), *Leone*, a novel in the "Round Robin Series" (1882). Consult H. W. Longfellow, *Tales of a Wayside Inn* (Boston, 1863), and Samuel Longfellow, *Life of Henry Wadsworth Longfellow* (Boston, 1886).

MONTI, Vincenzo (1754–1828). An Italian poet, born near Fusignano in the Province of Ferrara, Feb. 19, 1754. He studied jurisprudence very much against his will, being inclined to classical studies. In 1778 he went to Rome and stayed there some time as secretary to Prince Braschi. In 1791 Monti's evident leaning towards the ideas represented by the French Revolution brought him into bad odor, and the feeling against him was hardly allayed by the composition of the *Bassevilliana* (1793), which seemed to show his horror of the excesses due to revolutions. Finally in 1797 Monti fled from Rome and accompanied the French agent, Marmont, to Florence and Bologna. Afterward at Milan he obtained a position in the government of that region, and when the Cisalpine Republic fell he betook himself to Paris. After Napoleon's victory at Marengo he took the chair of oratory and poetry at the University of Pavia in 1802. By Napoleon's favor he held a position at the Collège de France, where he ended his tragedy, *Caio Gracco*, and began in Dantesque style a poem on the mathematician Mascheroni. When Napoleon became King of Italy Monti was made historiographer of the realm, an office which he lost in 1814, although he was permitted to retain his professorship. The rest of his life was passed in study, but was saddened by adversity. He died at Milan, Oct. 13, 1828.

The various political changes through which Monti passed reveal themselves in his literary works. The first edition of the lyrics of Monti was the *Saggio di poesie* (Leghorn, 1779); the next the *Versi* (1788). In 1783 or thereabout he began the *Feroniade*, a mythological poem in blank verse on the draining of the Pontine marshes. The work was never finished, although the poet spent the last years of his life in elaborating it. One of his most notable poems, because of its perfection of form, was the *Mascheroniana* (1801), in which the spirit of Mascheroni discourses on the misfortunes of Italy. To about 1825 belongs the *Sermone sopra la mitologia*, a manifesto in verse in favor of classicism and attacking romanticism. Although his temperament was not eminently dramatic, Monti essayed the drama with some success. The *Aristodemo* was printed at Parma in 1786 and performed at Valle di Roma in 1787. His *Galeotto Manfredi* is really a romantic drama; it was published at Rome in 1788. Monti's most successful dramatic composition is the *Caio Gracco* (Milan, 1802). His translations include versions of the *Satires* of Persius, of a fragment of the *Philoctetes* of Sophocles, and, most notable of all, of the *Iliad*. This last, published at Milan, 1810 and 1812, is pretty true to the tone of the Homeric epic. Monti's prose works are less numerous than his works in verse. Among them are the *Lezioni di eloquenza*, delivered from his chair at Pavia; the *Lettere filologiche;* the *Lettera*, addressed to Bettinelli; and the *Dialoghi*, on the Italian language. With the aid of his son-in-law, Perticari, he prepared a lexicographical work, the *Proposta di alcune correzioni ed aggiunte da Farsi al vocabolario della Crusca* (Milan, 1817–26). Consult: A. Monti, *Vincenzo Monti, ricerche storiche e letterarie* (Rome, 1873); Cantù, *Monti e l' età che fu sua* (Milan, 1879); Vicchi, *Vincenzo Monti, le lettere e la politica in Italia dal 1750 al 1830*, especially vols. vi–viii (Faenza, 1870; Rome, 1885–87).

MONTIANO Y LUYANDO, mōn'tē-ä'nō ē lōō-yän'dō, Agustín de (1697–1764). A Spanish poet, born at Valladolid. His first poem, *El robo de Dina*, was written while he was a young man at Majorca. Afterward he went to Madrid, where he was connected with the Department of State for many years. He was a man of acknowledged authority in literary matters, was elected a member of the Royal Spanish Academy of the Language, and became permanent director of the Royal Academy of History, founded at Madrid in 1738. With the accession of the Bourbon King Philip V everything French was the fashion, and all Montiano's writings were designed to reorganize Spanish drama on the classic lines of Racine. His two tragedies, *Virginia* and *Ataulfo*, were too dull ever to be acted, but when published they were accompanied by two *Discursos sobre las tragedias españolas* (2 vols., Madrid, 1750), which set forth Montiano's dramatic principles and were distinctly influential.

MONTICELLI, mōn'tē-chĕl'lē, Adolphe (1824–86). A French genre and portrait painter. He was born at Marseilles, studied at the Academy of Fine Arts in his native city, and when a young man went to Paris, where he lived almost continuously until 1870. He then returned to Marseilles and there passed the remainder of his life. During his last years he was demented, his imagination ran riot, and his paintings tended to become chaotic masses of color. His first manner was influenced by his study of the great Venetians, the great Dutch masters, of Delacroix and Díaz. Some splendor from each one of these sources enriched his own palette and brought to his second period remarkable color conceptions and combinations of tints.

Like Watteau, he painted "fêtes galantes," which are his favorite subjects. In them figures of gorgeously clothed men and women are grouped beneath splendid trees, or on marble steps, while dogs, horses, and other animals are introduced as accessories. Such are his "Court of Henry III" (1874), a characteristic work, and "Court Ladies" and "The Court of the Princess," both in the Metropolitan Museum of Art, New York. He is quite as effective with an Eastern subject, a scene from Boccaccio, with the landscapes of his own province, and with marines; "The Miraculous Draft of Fishes," a remarkable treatment of light effects on water; with still-life subjects and portraits. He is well represented in American collections, those of Mrs. Ichabod T. Williams, New York, Sir William Van Horne, Montreal, and especially in the Lambert collection, Paterson, N. J. Consult: Guigou, *Vingt planches d'après les tableaux originaux de Monticelli* (Paris, 1890); Gouirand, *Monticelli* (ib., 1900); Fézensac, "Monticelli," in the *Gazette des Beaux-Arts*, vol. xxv (3d series, ib., 1901); Faure, *Monticelli* (ib., 1908).

MON'TICEL'LO, mŏn'tĭ-sĕl'ō *or* -chĕl'ō (It., little mountain). The name given by Thomas Jefferson to his residence and estate in Albemarle Co., Va., about 3 miles east of Charlottesville. The mansion, designed by Jefferson himself and first occupied, though then in an unfinished condition, in 1770, stands on the summit of a hill overlooking a large extent of the neighboring country, and was long one of the finest and most picturesque residences in the South. It was Jefferson's home for 56 years, but passed out of the hands of his heirs a short time after his death. On the estate Jefferson, his wife, and two daughters were buried. Uriah P. Levy, U.S.N., who purchased Monticello 10 years after Jefferson's death, willed it to the people of the United States. The will having been successfully contested by heirs, Jefferson M. Levy, Congressman from New York, bought out the other owners. Subsequently he spent a large sum on the improvement of the estate and restored it from the 218 acres to which it had become reduced to the original 750. Beginning about 1912, Mrs. Martin W. Littleton, wife of a New York Congressman, carried on a campaign to have the government acquire the property by purchase or condemnation; the Virginia Legislature memorialized Congress on the subject; and in 1915 Secretary of State Bryan urged Mr. Levy, who had long been unwilling, to part with the property. Mr. Levy finally agreed to sell for $500,000 (less than half the supposed valuation), provided Monticello should not be turned into a museum, merely, but be used as a Virginia home for Presidents of the United States.

MONTICELLO, mŏn'tĭ-sĕl'ō. A town and the county seat of Drew Co., Ark., 40 miles west of Arkansas City, on the Arkansas, Louisiana, and Gulf and the St. Louis, Iron Mountain, and Southern railroads (Map: Arkansas, D 4). There are cotton and other manufactures and a considerable trade in fruit, cotton, and lumber. The Arkansas Baptist Orphans Home is here, also Hinemon University School and the State agricultural school. The town owns its water works, sewage system, and electric-light plant. Pop., 1900, 1579; 1910, 2274.

MONTICELLO. A city and the county seat of Jefferson Co., Fla., 31 miles east by north of Tallahassee, on the Seaboard Air Line and the Atlantic Coast Line railroads (Map: Florida, C 1). It is interested principally in fruit growing and cotton raising. Monticello is one of the oldest towns in Florida. Pop., 1900, 1076; 1910, 1829.

MONTICELLO. A city and the county seat of Piatt Co., Ill., 28 miles northeast of Decatur, on the Sangamon River and on the Wabash and the Illinois Central railroads (Map: Illinois, H 5). It has a fine courthouse, the Allerton Library, and an excellent high-school building. It is surrounded by a productive farming and stock-raising country and has a large sirup factory. The water works are owned by the city. Pop., 1900, 1982; 1910, 1981.

MONTICELLO. A city and the county seat of White Co., Ind., 21 miles west of Logansport, on the Tippecanoe River and on the Pittsburgh, Cincinnati, Chicago, and St. Louis and the Chicago, Indianapolis, and Louisville railroads (Map: Indiana, D 3). Good water power is derived from the river; and there are various manufacturing establishments, the principal of which are flouring mills, cement, tile, and agricultural-implement factories, thread mill, and a poultry-packing plant. Monticello contains a Carnegie library. The water works are owned and operated by the municipality. Pop., 1900, 2107; 1910, 2168.

MONTICELLO. A village and the county seat of Sullivan Co., N. Y., 113 miles by rail northwest of New York, on the New York, Ontario, and Western Railroad (Map: New York, A 1). There are manufactures of leather goods, gloves, and perfume, but the village is known principally as a summer resort, attracting thousands of persons annually. Besides its many hotels and boarding houses there are a high school, convent, and fine courthouse. The Mongaup Falls here afford excellent water power. Monticello was ravaged by fire in 1909, the property loss being estimated at $1,000,000. The water works are owned by the village. Pop., 1900, 1160; 1910, 1941; 1915, 2166.

MONTIGNIES-SUR-SAMBRE, môn'tē'nyĕ'-sür-säN'br. A town of Belgium, in the Province of Hainaut, situated 30 miles south of Brussels. It is the centre of a coal-mining region and has machine shops, blast furnaces, rolling mills, nail factories, and manufactures of chicory. Pop., 1900, 18,440; 1910, 21,748.

MONTIJO, môn-tē'hō, EUGÉNIE-MARIE DE. Empress of the French. See EUGÉNIE-MARIE DE MONTIJO.

MONTILLA, môn-tē'lyȧ. A town of south Spain, in the Province of Cordova, 23 miles south of Cordova, on the railroad between that city and Malaga (Map: Spain, C 4). It stands on a hillside rising from the south bank of a tributary of the Jenil. Manufactures of coarse linen and earthenware are carried on and oil mills are in operation. A famous white wine, called Amontillado and possessed of a peculiar flavor, is produced in the vicinity. The palace of the dukes of Medinaceli, located here, is the birthplace of Gonsalvo de Córdoba, the Great Captain. Pop., 1900, 12,943; 1910, 13,565.

MONTJOIE, môn'zhwȧ', or **MONTJOYE.** The name given in the Middle Ages to any hillock situated on the boundary between two territorial divisions and serving as a meeting place for hostile armies. From this the word became a common war cry. Special designations were added for each political division: e.g., Montjoie Saint-Denis for the kings of France, Montjoie Saint-George for the kings of England, etc.

Montjoie is also the surname of the king-at-arms of France.

MONTLOSIER, môn'lô'zyā', François Dominique de Reynaud, Count de (1755–1838). A French politician and publicist, born at Clermont-Ferrand, Puy-de-Dôme. In 1789 he was elected a deputy to the States-General, where he upheld the royal cause; and when the Constituent Assembly gave way to the Legislative Assembly in 1791, he emigrated and joined the royalist army at Coblenz. From 1794 to 1801 he published the *Courrier de Londres* in London, and then for a short time the *Courrier de Londres et Paris* in Paris. In 1802 he edited the *Bulletin de Paris*, conducting an anti-English agitation. At the wish of Napoleon he prepared *De la monarchie française* (3 vols., 1814), a work intended as a justification of the Empire. The clerical policies of Charles X after the Restoration aroused his anger and led him in 1826 to publish *Mémoires à consulter sur un système réligieux, politique, et tendant à renverser la religion, la société, et la trône*, which, like his other writings of the same stamp, had much influence. After the revolution of 1830 he supported the government of Louis Philippe and in 1832 he entered the House of Peers. He wrote also: *Mémoires sur la révolution française, le consulat, l'empire, la restauration, et les principaux événements qui l'ont suivie* (2 vols., 1829) and *Mystères de la vie humaine* (2 vols., 1829).

MONTLUC, môn'lụk', Blaise de. See Monluc.

MONTLUÇON, môn'lụ'sôn'. A town in the Department of Allier, France, on the Cher, 45 miles northwest of Clermont-Ferrand (Map: France, N., H 6). It is the industrial capital of Allier. The town consists of two parts—the mediæval portion on the steep right bank of the river with its hôtel de ville, formerly a convent, another abandoned convent used as a college, and its timbered houses dating from the fifteenth and sixteenth centuries, dominated by a castle-crowned hill (the ancient fortification now converted into barracks); and the newer portion extending along the left bank of the Cher, where are located the extensive manufactories of glass, steel, iron, sewing machines, chemicals, and liquors. The town owes its rapid development to the opening up of the Commentry coal field. It has a considerable trade in grain and fruit. Pop., 1901, 35,062; 1911, 33,799.

MONTMAGNY, môn'má'nyĕ. A town and the capital of Montmagny Co., Quebec, Canada, on the St. Lawrence River and the Intercolonial Railway, 35 miles east-northeast (direct) of Quebec (Map: Quebec, H 4). The public buildings and institutions include the courthouse, theatre, Roman Catholic college and convent, high school, customhouse, and an asylum for the aged. Among the manufacturing establishments are grist, saw, pulp, and lumber mills, carding and planing mills, and manufactories of wagons, foundry and machine-shop products, sashes and doors. Butter is also produced. The town has an electric-lighting system. Pop., 1901, 1919; 1911, 2617.

MONTMAGNY, Charles Jacques Huault de (?–c.1651). A governor of New France. His education was under Jesuit auspices and he became a Knight of Malta. Though probably appointed Governor soon after the death of Champlain in 1635, he did not arrive at Quebec until June, 1636. During his stay the strength of the colony increased, a seminary for Huron boys was founded, and the Iroquois were defeated in several skirmishes. His administration was a continued struggle to maintain the feeble French settlements against the power of the Iroquois, during which the Huron and Algonquin allies of France were almost annihilated. Mary H. Catherwood's (q.v.) *Romance of Dollard* (1889) was based on public and private papers describing the fight at Richelieu River. As a result of the fight at the mouth of the Richelieu River a peace was made at Three Rivers in 1645, but this was broken the next year. Montmagny was intensely religious, but viewed with disfavor the colony at Montreal, thinking it a mistake to divide the strength of the missionary forces. He was recalled in September, 1647.

MONTMARTRE, môn'mär'tr'. A northern district of Paris.

MONTMEDY, môn'mā-dē'. A fortified town of the second class in the Department of Meuse, France, near the German frontier, on the Chiers, 31 miles east-southeast of Sedan. It consists of two parts, the upper containing the citadel on a commanding rock 960 feet above the sea, and the lower portion, or Bas-Médy, surrounded by a strongly fortified wall. It was in the line of the German invasion of France in 1870 and resisted bombardment in September, but succumbed to a second attack December 14. It was captured by the Germans in the European War which began in 1914. (See War in Europe.) Pop., 1901, 2600; 1911, 2774.

MONTMORENCY, mŏnt'mô-rĕn'sĭ. A village in Quebec Co., Canada, on the Quebec and Light and Power Company railways, 6 miles northeast of the city of Quebec (Map: Quebec, G 4). The celebrated Montmorency Falls (q.v.) are situated here. There is a children's hospital. A large cotton mill gives employment to over 1000 persons and there are three saw mills. The village owns its water, lighting, and sewerage systems. Pop., 1911, 1717.

MONTMORENCY, môn'mô'răn'sē'. An old and illustrious French family named from a village near Paris, whose members in 1327 received the title of first baron of France. The mythical founder of the house is Lesbius (or *Lisbius*), who is said to have died with the martyr Dionysius; the first authentic lord of Montmorency is Bouchard I, who lived in the tenth century. Matthieu II (1189–1230) is the most famous member of the family before the sixteenth century. He was called the Great Constable. In the reign of Philip Augustus he captured Château Gaillard, in Normandy, and in 1214 helped to win the battle of Bouvines; in 1226 he defeated the Albigenses; and during the regency of Queen Blanche, the mother of Louis IX, was a powerful upholder of royal power as opposed to that of the great vassals. After Matthieu's death the family divided into two houses—the baronial branch of Montmorency and the younger line of Montmorency-Laval. The former attained the title of duke with Anne de Montmorency (1493–1567). He was born at Chantilly and was educated with the princes of the royal blood. Becoming a soldier at an early age, he distinguished himself by his gallantry and military skill in the wars of Francis I, particularly at Melegnano (1515), at the defense of Mézières (1521), and in the battle of La Bicocca (1522). In 1522 he was made marshal of France and in 1525 was taken prisoner with his sovereign in the battle of Pavia. He then helped to negotiate the Treaty of Madrid, and in 1526 became

grand master of the royal household and Governor of Languedoc. In 1536 he repelled Charles V's attack on Marseilles, and in 1538 was made Constable of France. In this capacity he directed the foreign and domestic affairs of France for some years with energy and ability. His brusqueness of manner, however, made him an object of dislike to many; and the suspicions of the King having been aroused against him, he was suddenly banished from court in 1541. The next six years were passed in retirement on his estates, but with the accession of Henry II (q.v.) in 1547 he came again to the head of affairs, though he shared this power with Henry's mistress, Diana of Poitiers, and the family of Guise. In 1557 he commanded the French army which was defeated at Saint-Quentin (q.v.). Here he was taken prisoner, but was liberated by the treaty made at Cateau-Cambrésis between France and Spain in 1559. During the minority of Charles IX Montmorency with the Duke of Guise and the Marshal Saint-André composed the famous triumvirate which resisted the influence of Catharine de' Medici in state affairs. He commanded the royal army against the Huguenots, though Coligny was his nephew. He was captured at Dreux (1562), but later gained several victories over them. In 1563 he forced the English to evacuate Havre. At the battle of Saint-Denis against the Huguenots under Condé he received a fatal wound and died in Paris on the following day, Nov. 11, 1567.—HENRY II, fourth Duke of Montmorency (1595–1632), was the grandson of the Constable Anne de Montmorency and was born at Chantilly. When he was 17 years of age Louis XIII made him Admiral of France and Viceroy of Canada, and in 1613 he became Governor of Languedoc. When the Huguenot wars broke out afresh he fought successfully for the King and in 1625 took the islands of Ré and Oléron during the siege of La Rochelle. He afterward gained other victories, and in 1630 received the chief command of the French troops in Piedmont during the War of the Mantuan Succession. He defeated the Spaniards and received the marshal's baton. Having espoused, in 1632, the cause of Gaston, Duke of Orléans, brother of King Louis XIII, and opponent of Richelieu, he was declared guilty of high treason, and Marshal Schomberg defeated him at Castelnaudry (1632) and took him prisoner. He was carried to Toulouse and there sentenced to death through the influence of Richelieu. This sentence was summarily executed; in spite of powerful intercession on his behalf by various rulers, he was beheaded Oct. 30, 1632.—LAVAL MATTHIEU JEAN FÉLICITÉ, Duke of Montmorency-Laval (1766–1826), was born in Paris. He served in the American Revolution with his father; and after the outbreak of the French Revolution as a representative of the nobility in the Constituent Assembly he urged the abolition of the privileges of his order, but he became conservative after the attack on the Tuileries. After the overthrow of the constitutional monarchy of 1791 he joined Madame de Staël, with whom he was long intimate, at Coppet in Switzerland, and returned to France in 1795, then to become quite as closely attached to Madame Récamier, whose memoirs give a vivid picture of him. In 1821 Montmorency was appointed Minister of Foreign Affairs, and as representative of France at the Congress of Verona (1822) urged armed intervention in Spain in behalf of Ferdinand VII. In 1825 he was made a member of the French Academy. Consult Vetillard, *Notice sur la vie de M. le duc de Montmorency* (Le Mans, 1826).

MONTMORENCY-BOUTEVILLE. See LUXEMBOURG, DUKE OF.

MONT'MOREN'CY, FALLS OF. A picturesque cascade, 150 feet wide and 265 feet high, at the mouth of the Montmorency River, an affluent of the St. Lawrence, 6 miles northeast of Quebec, Canada (Map: Quebec, G 4). They supply the power for Quebec's electric plants and are much visited by tourists.

MONTMORENCY, FRANÇOIS XAVIER DE LAVAL-. See LAVAL-MONTMORENCY, F. X.

MONTMORENCY ET D'ANGOULÊME, DUCHESSE DE. See DIANE DE FRANCE.

MONTORO, mŏn-tō'rō. A town of south Spain, in the Province of Cordova. It is situated on a rocky peninsula formed by the south bank of the Guadalquivir, 27 miles by rail east-northeast of Cordova (Map: Spain, C 3). The river is here spanned by one of its best bridges, built in the sixteenth century by popular subscription. In spite of the uneven ground, the streets are well paved and they are lighted by electricity. One of the largest and best hospitals of south Spain is located here. There are many interesting Roman, Gothic, and Moorish remains. The chief industry is the manufacture and exportation of olive oil. Pop., 1910, 15,144.

MONTORSOLI, mŏn-tôr'sō-lē, FRA GIOVANNI ANGELICO (or ANGIOLODA) (1507–63). A Florentine sculptor and architect. He was born at Montorsoli; worked in Florence, Rome, Genoa, Bologna, and Messina; visited Paris; and died in 1563 in Florence, where he was interred in a tomb erected by himself (1561) in the chapter house of the Annunziata Church. He was for a short time connected with the Order of the Servites, whence the Fra commonly prefixed to his name. His earliest important work was at Genoa (1522–25), where he built or enlarged the Serra and Doria palaces and remodeled the interior of the church of San Mateo, to which he added a chapel with a monument to Andrea Doria. Between 1530 and 1534 he assisted Michelangelo on the Medicean Chapel, Florence, for which he carved the statue of St. Cosmas. In 1547 he went to Messina, where he executed the fountain in front of the cathedral and another near the customhouse, besides designing several chapels in the cathedral, the church of San Lorenzo, and the lighthouse.

MONTOUR, mŏn-tōōr', ESTHER. An Indian chieftainess, usually known by the name of Queen Esther. She is reputed to have been the granddaughter of Count de Frontenac, and became the wife of Eghobund, a chief of the Senecas. Owing to her strength of mind she gained great influence among her people. She several times visited Philadelphia with the delegates of the Six Nations, and is said to have comported herself on such occasions with dignity and good manners. Despite some good qualities, however, she was at heart a savage, and in the Wyoming massacre of July, 1778, tomahawked more than a dozen helpless prisoners in revenge for the death of her son, who was killed the day before. Consult Frederick Cook, *Journals of the Military Expedition of Major-General John Sullivan against the Six Nations of Indians in 1779, with Records of Centennial Celebrations* (Auburn, N. Y., 1887).

MONT PELÉE. See PELÉE, MONT.

MONTPELIER, mŏnt-pē'lyĕr. A city in

Blackford Co., Ind., on the Salomonia River, 39 miles by rail south by west of Fort Wayne, on the Fort Wayne, Cincinnati, and Louisville Railroad (Map: Indiana, G 3). It is surrounded by oil wells, and has machine shops, brass and iron foundries, stone crushers, and manufactories of steel castings and shovels. Montpelier contains a Carnegie library. Pop., 1900, 3405; 1910, 2786.

MONTPELIER. A village in Williams Co., Ohio, 59 miles west of Toledo, on the St. Joseph River and on the Wabash Railroad (Map: Ohio, A 2). It contains railroad repair shops and has a large manufactory of hardware-store fixtures. The village owns its water works and electric-light plant. Pop., 1900, 1869; 1910, 2759.

MONTPELIER. A city, the capital of Vermont, and county seat of Washington County, 40 miles by rail southeast of Burlington, on the Winooski River and on the Central Vermont and the Montpelier and Wells River railroads (Map: Vermont, D 4). The handsome capitol is built of granite, its dome rising to a height of 124 feet, and surmounted by a statue representing Agriculture. Among other features of the city are the State Library, the Wood Art Gallery, the Kellogg-Hubbard Library, Washington County grammar and Montpelier high schools, the historical society, courthouse and city hall buildings, State arsenal, Federal Building, National Life Building, Montpelier Seminary, Green Mount Chapel, Heaton Hospital, and the Montpelier Country Club. The principal industries are granite working and the manufacture of saddlery, hardware, clothespins, patent medicines, crackers, and saw-mill and other machinery. The city controls an important trade with the surrounding region, which is largely agricultural, and is the centre of large insurance interests. The city owns and operates the water works. Pop., 1900, 6266; 1910, 7856. A charter to the land about Montpelier was secured in 1781, but no settlement was made until 1787. In 1791 Montpelier was organized as a town and in 1805 became the capital of the State; it was incorporated as a village in 1855, and in 1894 it was chartered as a city. Montpelier is the birthplace of Admiral George Dewey (q.v.). Consult D. P. Thompson, *History of Montpelier, 1781–1860* (Montpelier, 1860), and Hemenway, *History of the Town of Montpelier* (ib., 1882).

MONTPELLIER, môn'pĕl'lyā'. The capital of the Department of Hérault, France, at the junction of the Lez and Merdansun, 76 miles west by north of Marseilles and 7 miles from the Mediterranean, with which it is connected by canal (Map: France, S., H 5). Seen from a distance Montpellier has an imposing appearance. Its suburbs are clean and well built, although the older portion of the town has narrow, crooked streets. Boulevards have replaced the ancient walls and mediæval fortifications, of which the only remains are the citadel and the twelfth-century Tour de la Babotte. The principal attraction is the Peyrou, or public square, on high ground commanding splendid views of the Alps, the Cévennes, the Pyrenees, and the Mediterranean. It is ornamented with a triumphal arch and equestrian statue, both commemorating Louis XIV. The water works, water tower, and aqueduct, having a double-arched structure 2893 feet long, are monumental features. The most noteworthy buildings are the theatre, the exchange, the halls of justice, the prefecture, and the observatory. Montpellier University, founded in 1289, with faculties of law, medicine, science, letters, and pharmacy, had (1913) 1958 students and a library of 125,000 volumes, including many old and rare works. There are also schools of agriculture. Montpellier has a botanical garden, founded in 1593, and one of the oldest in Europe, a public library of 130,000 volumes, and a museum, founded by the painter F. X. Fabre, containing one of the finest provincial collections of paintings and curios in France. The climate is mild, and the city is a favorite winter resort for invalids. Among the industries the making of wine is the most important. Machinery, chemicals, scales, billiard tables, candles, chocolate, paper, soap, baskets, corks, sugar, leather, cotton, and woolen goods are manufactured, and the city is noted for its fine confectionery. There is an important trade in manufactured articles, wine, olive oil, and fruits. Founded in the eighth century about a Benedictine abbey, Montpellier began to prosper in the twelfth century, when its school of medicine acquired fame. It had a stirring history in the Middle Ages, during which it was for a time under the rule of Aragon, Majorca, and Navarre, before its final union with France towards the close of the fourteenth century. Comte, the philosopher, was born at Montpellier. It was a stronghold of the Protestants during the wars of the Reformation. Pop., 1901, 75,950; 1911, 80,230. Consult: Aigrefeuille, *Histoire de Montpellier* (Montpellier, 1877–88); Guiraud, *Recherches topographiques sur Montpellier* (ib., 1895); Febre, *Histoire de Montpellier* (ib., 1897).

MONTPELLIER, University of. A French university. As early as the first half of the twelfth century the university of medicine at Montpellier was famous beyond any other in Europe save Salerno. To this, about 1160, was added a university of law by Placentinus, a distinguished doctor of law exiled from Bologna and Mantua. A university of theology grew up around a Carthusian college founded in 1263, and a university of arts came into existence somewhat earlier. Besides the colleges of the four mendicant orders, seven others were founded from time to time, and from the twelfth to the fourteenth century Montpellier was one of the great universities of Europe. Save in medicine, the fame of the university declined greatly after the latter period. It remained the chief medical school of France till modern times. Here Rabelais taught in 1537, and in the next century, during a period of Protestant supremacy, Casaubon. Under Napoleon the university was reorganized and thrown into the general scheme of national education. It comprises four faculties—law, medicine, mathematics-science, and philosophy—besides a school of pharmacy. In 1913 it had 1958 students. Its library contains nearly 125,000 volumes.

MONTPENSIER, môn'pän'syā', Anne Marie Louise d'Orléans, Duchess of (1627–93). The daughter of Gaston d'Orléans, brother of Louis XIII of France, known as La Grande Mademoiselle. She grew up beautiful, eccentric, and ambitious. While still a child there was idle talk of a marriage with Louis XIV of France, and subsequently her matrimonial aspirations centred about the persons of the future Philip IV of Spain, the Emperor Ferdinand III, and his brother, the Archduke Leopold. All these plans miscarried, probably through the secret hostility of Cardinal Mazarin. Upon the outbreak of the troubles of the Fronde, Mademoiselle, with

her worthless father, whom she appears to have loved, remained faithful to the court, but in 1651 she embraced the cause of the great Condé, whom she originally hated most bitterly, but later seemingly sought in marriage. Her vanity and courage found delight in the rôle of party leader, which she now was enabled to play. In March, 1652, she held the city of Orléans against the royal army and then went to Paris, where her masculine decision made her for a time the leader practically of the resistance to the King. On July 2, 1652, when Condé, after stubborn fighting in the Faubourg Saint-Antoine, had been decisively beaten by Turenne, Mademoiselle saved the Prince's army from annihilation by training the guns of the Bastille on the royal forces and opening the gates of the city to receive the defeated troops. In October she was banished from the court and lived for some time in retirement. She was recalled to court in 1657 and after some years fell violently in love with the Duke of Lauzun (q.v.), a handsome and accomplished Gascon cavalier and a favorite of Louis XIV. In December, 1670, the King consented to the marriage, but within three days withdrew his sanction, owing probably to the enmity of Madame de Montespan for Mademoiselle. In the following year Lauzun was thrown into the Bastille, where he remained for 10 years in spite of the exertions of Mademoiselle, who finally obtained his freedom by ceding the County of Eu and the Principality of Dombes to the Duke of Maine, son of Madame de Montespan. There is some reason to believe that a secret marriage took place between Lauzun and Mademoiselle. It is certain that Lauzun repaid her devotion by brutal neglect and that they became totally estranged. She left *Mémoires*, first published at Amsterdam in 1729 and subsequently edited by Chéruel (Paris, 1858). A religious essay, *The Eight Beatitudes*, has been edited in 1908 by E. Rodocanachi under the title *Un ouvrage de piété inconnu*. Consult: Margerie, *La Grande Mademoiselle* (Nancy, 1869); Arvède Barine, *La Grande Mademoiselle, 1627–1652* (New York, 1902); id., *Louis XIV and la Grande Mademoiselle, 1652–1693* (ib., 1905); E. C. Price, *Princess of the Old World* (ib., 1907).

MONTPENSIER, Antoine Marie Philippe Louis d'Orléans, Duke of (1824–90), fifth son of Louis Philippe. He was educated at the Collège Henri IV and went to Africa in 1844 as lieutenant in the artillery. After a tour in the East he married, in 1846, the Infanta Luisa de Bourbon, sister of Queen Isabella II of Spain. The marriage created great excitement, Louis Philippe being generally credited with the intention to seat his son upon the throne of Spain. During the revolution of 1848 the Duke resided in England, but soon returned to Spain, taking up his residence at Seville. In 1859 he was appointed captain general of the Spanish army. During the political agitation preceding the flight of Isabella the Duke quitted Spain. Returning in 1868, under the provisional government, he offered himself as a candidate for the throne, but destroyed whatever chances for election he may have had by killing his cousin, the Infante Don Enrique de Bourbon, in a duel, March 12, 1870. His eldest daughter, Marie, was married to the Count of Paris in 1848, and his third daughter, Maria de las Mercedes, married her cousin, Alfonso XII, in 1878.

MONTREAL, mŏn'trē-ȧl' (Fr., Mount Royal). The largest city in the Dominion of Canada, situated in Hochelaga County in the Province of Quebec, 180 miles by rail southwest of the city of Quebec and 420 miles by rail north of New York, on the southeast side of Montreal Island (30 miles long by 7 to 10 miles wide), at the confluence of the St. Lawrence and Ottawa rivers, 620 miles from the sea by the course of the St. Lawrence (Map: Quebec, E 5). It occupies a low tract of land between the St. Lawrence River and Mount Royal, a mountain rising to an elevation of 769 feet above the sea, which gives a picturesque background to every view of the city, the summit being laid out as a public park of 460 acres. Fine residential streets lie in terraces upon the slope. The chief business streets are St. James, St. Paul, St. Lawrence, McGill, Bleury, Craig, Notre Dame, St. Catherine, Ontario, and Wellington. The French section is on the east, the dividing line being St. Lawrence Street. Montreal is about 7 miles long and contains many public squares and parks, such as Dominion (with a statue of Sir John A. Macdonald and a monument to Canadian soldiers who fell in the Boer War), Victoria (with a fountain and a statue of Queen Victoria), St. Louis, and the Víger Gardens, Lafontaine, and Mount Royal parks. The buildings are largely of gray limestone, quarried in the vicinity, and include the church of Notre Dame, built in 1824, opposite the site of an earlier church (1672); it is one of the largest cathedrals in America, being 255 feet long by 145 feet wide, and can accommodate over 10,000 people. Its towers are 220 feet high and have a noted chime of bells. Near it is the seminary of St. Sulpice, the oldest building in Montreal (1684). Other important edifices and places of interest are the courthouse; city hall; Bank of Montreal; customhouse; the old Château de Ramezay (1705), for a time the official residence of the British governors and the headquarters of the American general and commissioners in 1775–76; the Champ de Mars, the old parade ground of the French and British troops; Jacques Cartier Square, with a statue of Nelson (1808); Bonsecours Market, 500 feet long; the church of Notre Dame de Bon Secours; St. Patrick's Church; the cathedral of St. James, on Dominion Square, a reproduction on half the scale of St. Peter's in Rome; Christ Church Cathedral (Episcopal), a fine example of Gothic architecture; St. James's Methodist Church; church of Notre Dame de Lourdes (1874); the Jesuit Church, noted for its frescoes; St. Andrew's; St. Paul's; St. George's; Erskine Presbyterian; and Mountain Street Methodist. The Windsor, Place Viger, Ritz-Carlton, and Queen's hotels are fine structures. Among other points of interest are the Fraser Institute, a public library; the art gallery; the Protestant and Roman Catholic deaf and dumb asylums; an asylum for the blind; and the convents of the Holy Names of Jesus and Mary, and Villa Maria. The most important educational institutions are McGill College (q.v.), founded in 1824 by a bequest of James McGill, also containing the Macdonald scientific laboratories, the Redpath Library, an observatory, and a natural history museum; the Montreal branch of the Roman Catholic Laval University; and the Collège de Montreal, or Petit Séminaire. There are Presbyterian, Wesleyan, and other colleges, academies, schools, and libraries; Grey Nunnery, a hospital and orphan asylum; Naza-

reth Asylum for blind children; the Hôtel Dieu, founded in 1644 by Mademoiselle Mance, an original settler of Montreal; the Royal Victoria, the Montreal General, the Notre Dame, the Children's Memorial, and the Western hospitals; and the Victoria Rifles and Royal Scots armories and the Drill Sheds. There are many publications printed in French and English. The leading dailies are the *Gazette*, founded in 1778 and continuous since 1795, the *Herald*, the *Star*, and the *Witness*.

Montreal's wealth and importance first accrued from the fur, lumber, and grain trade of the Northwest. It is now the metropolis of Canada and the chief commercial city and port of entry. Its fine harbor, with quays, wharves, and docks of solid masonry extending for miles, lies at the head of ship navigation and accommodates vessels up to 30-feet draft at low water. The construction of canals has enabled Montreal to command the navigation of the Great Lakes. The Lachine Canal was opened in 1825, the Grand Trunk Railway in 1852; the Victoria tubular bridge, built over the St. Lawrence in 1854–59, was reconstructed and enlarged as a truss bridge in 1898–99; the Champlain and St. Lawrence Railway, from Laprairie to St. John's, was opened in 1836, and the Canadian Pacific in 1886. Other railways entering Montreal are the Intercolonial, Canadian Northern, Grand Trunk Pacific, New York Central, the Central Vermont, the Rutland, the Quebec, Montreal, and Southern, and the Delaware and Hudson. Various steamship lines run to transatlantic ports, and lines also run to the chief eastern Canadian ports. The exports in 1913 amounted to $99,398,102, and the imports to $154,485,087; in 1890 they were respectively $31,660,216 and $45,934,406. In 1913 the total number of ocean-going ships entering port was 820, of a total tonnage of 2,690,535. Inland clearances numbered 13,426, of a measurement of 5,703,467 tons. The exports and manufactures include lumber, grain, flour, apples, butter, phosphates, cheese, boots, shoes, cottons, woolens, clothing, rubber goods, hardware, glass, carriages, sleighs, drugs, paints, steam engines, locomotives, railway cars, electric goods, confectionery, cement, tobacco, machinery, boilers, sewing machines, musical instruments, paper, etc. There are also saw, flour, and rolling mills, brass and iron foundries, lead works, etc., gas and electric-light plants, electric street railroads, and a costly system of water works. The value of the manufactured output in 1910 was $166,296,972, as compared with $71,099,750 in 1900, an increase of over 133 per cent. Electric power for manufacturing is supplied from Shawinigan Falls, Lachine Rapids, and Chambly Rapids. There are many banks, the chief of which is the Bank of Montreal, one of the world's greatest banks. The bank clearings in 1913 were $2,879,118,000. The climate presents great extremes of heat and cold, the temperature reaching 90° in summer and sometimes sinking to 20° below zero in winter. The winter carnivals which formerly attracted thousands of visitors to engage in gay skating tournaments, in snowshoe parades, masquerades, tobogganing, and the storming of the ice castle (generally erected in Dominion Square) by torchlight are no longer prominent as a feature of the winter diversions.

Montreal's first record dates from 1535, when Jacques Cartier ascended the St. Lawrence and found an Indian village named Hochelaga at the foot of the mountain—a name still preserved in a portion of the modern city. It was inhabited by the Hochelaga or Beaver Indians, active traders, who traversed the St. Lawrence from their district to Ottawa. When Champlain visited the spot in 1603 the Indian town had vanished, as the result of a war between the Hurons and the Iroquois; and here he established, eight years later, a trading post. In 1642 Paul de Chomedy, Sieur de Maisonneuve, for La Compagnie de Montréal founded the Ville Marie-de-Montréal on romantic ideas of religion and patriotism. The town was engaged in struggles with the Iroquois for many years and its inhabitants suffered many hardships; but in 1665 the Marquis de Tracy arrived from France with the famous Carignan-Salières Regiment, which broke the power of the red men. In 1672 the town became the centre of the fur trade and the starting point for military and exploring expeditions, from which it became known as the Mother of Cities. With Indian massacres and warfare, and strife between the religious and civil authorities, Montreal soon acquired a romantic history. In 1760 the British took the town, and their entry marked a new era. In 1775–76 it was occupied by the Continental forces, but the citizens resented Franklin's incitement to revolt against British rule. In 1844 it was made the seat of the Canadian government, but it lost the honor after the riot of 1849, when the Parliament buildings were destroyed by the mob. The British garrison was removed in 1870. In 1901 a great fire devastated four acres of the commercial portion of the city, the Board of Trade building constituting the chief loss. The damage was estimated at $4,000,000.

With its suburbs Montreal's population numbered, in 1901, 266,826, half being French, the rest of Irish, English, and Scottish descent; in 1911, 470,480; in 1915 (local est.), 570,000; including suburbs, 656,500. Three-fourths of the inhabitants are Roman Catholics, and the city is the seat of both Roman Catholic and Anglican bishops.

Consult: A. Sandham, *Ville Marie: or, Sketches of Montreal Past and Present* (Montreal, 1870); W. Maclennan, *Montreal and Some of the Makers Thereof* (ib., 1893); N. M. Hinshelwood, *Montreal and Vicinity* (ib., 1904); and the authorities referred to under CANADA. See Plate of LACHINE RAPIDS.

MONTREAL. An island in the Province of Quebec, Canada, formed at the junction of the Ottawa with the St. Lawrence River (Map: Quebec, E 5). It is 30 miles long, 10 miles wide at its greatest breadth, and contains 197 square miles. It is of great fertility and productiveness and is celebrated for its apple orchards. Undulations, called coteaux, culminate in Mount Royal, 769 feet high. The city of Montreal is located on it.

MONTREAL D'ALBANO, mōn'trâ-äl' dâl-bä'nō, or FRA MORIALE, frä mō'rē-ä'lā, or MONREALE (?–1354). A famous Italian condottiere. He was a native of Provence (France) and as a young man entered the Order of the Knights of St. John, but was expelled. He subsequently distinguished himself as a soldier under Louis I of Hungary in the wars with Naples. About 1353 he started his Great Company, a band of mercenaries, which soon became the terror of Italy. In 1354 he aided Rienzi in getting possession of Rome, but was later accused of

intriguing with Rienzi's enemies, the Colonna. He was seized and, after a short trial, beheaded on Aug. 29, 1354. Consult Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages*, vol. vi (trans. from the 4th Ger. ed., London, 1898).

MONTREUIL, môn'trē'y'. A town of France in the Department of Seine, situated 5 miles east of Paris, near Vincennes. It is surrounded by large peach orchards, has gypsum quarries, and manufactures porcelain, paints, toys, pianos, gelatin, glue, soaps, glass, and chemicals. Pop. (commune), 1901, 31,673; 1911, 43,217.

MONTREUIL, Gerbert de (fl. c.1250). A French poet of the thirteenth century about whom hardly anything is known. His great work is the *Roman de la violette* (q.v.). Gerbert also wrote a long sequel to the *Perceval* of Chrestien de Troyes. This sequel is still unprinted.

MONTREUIL (MONTEREAU), Pierre de (?–1266). A French architect of the Gothic period. He was principal architect to Louis IX, for whom, in 1245–48, he built the Sainte Chapelle (q.v.), one of the finest creations of the matured Gothic style. Among other important works built by him were the refectory and the lady chapel of the monastery of Saint-Germain des Prés, destroyed during the Revolution, the original Sainte Chapelle at Vincennes (demolished 1400), and possibly the refectory of Saint-Martin des Champs at Paris. His relative, Eudes de Montreuil (died 1289), architect, engineer, and sculptor, accompanied St. Louis to the Holy Land, where he fortified Jaffa. Returning to Paris in 1254, he built there the Hospice des Quinze Vingts, the chief asylum of the blind, and a number of churches. All of these buildings were demolished during the Revolution. In 1285 he became architect to the King. For his own tomb in the church of the Cordeliers he carved a relief of himself between his two wives.

MONTREUX, môn'trē'. A parish in the Canton of Vaud, Switzerland, at the east extremity of Lake Geneva, including the villages of Vernex, Clarens, Territet, Glion, Veytaux, Colonges, Charnex, and others (Map: Switzerland, A 2). The district is noted for its romantic Alpine scenery and mild, healthful climate and is a favorite resort of tourists and invalids during fall and winter months. From Glion a rack and pinion railway leads up to the Rochers de Naye, at 5800 feet elevation, commanding a magnificent view. Near Veytaux is the celebrated castle of Chillon. Pop., 1900, 15,854; 1910, 18,800. Consult F. H. Gribble, *Montreux* (New York, 1908).

MONTROND, môn'trōn', Casimir, Count of (1768–1843). A French political agent. He served in the army up to the Revolution and then rashly stayed in Paris instead of accompanying his family in exile. In 1794 he was arrested and imprisoned, but escaped with Mademoiselle de Coigny, Duchess of Fleury, the heroine of Chénier's *Jeune captive*, whom he married, but soon divorced. It was at this time that he came under the influence of Talleyrand and became his most trusted agent. Having been persecuted by Napoleon, whose régime he severely criticized, he was exiled in 1809, finally escaping to England in 1812. Montrond was prominent in bringing about the Second Restoration. After the revolution of 1830 he lived in England, where he boasted that Louis Philippe paid him 20,000 francs a year to speak well of him in the English clubs. He returned to France and died soon afterward.

MONTROSE, mont-rōz'. A royal, municipal, and police burgh and seaport in Forfarshire, Scotland, at the mouth of the South Esk, 90 miles northeast of Edinburgh (Map: Scotland, F 3). The town stands on a level peninsula between the mouth of the river and the basin of the Esk (an expanse 7 miles in circumference and dry at low water). It has a town hall, academy, museum, house of refuge, and royal asylum. A fine suspension bridge connects the town with Rossie Island. The magnificent tower, named the Scurdyness Lighthouse, is at the mouth of the Esk. The town has one of the best golf courses in Scotland. Flax spinning is the chief industry; linen, canvas, rope, starch, soap, chemicals, machinery, leather, cabinetwork, and beer are the chief products. Fish curing and shipbuilding are also carried on. The corporation owns the water supply. The harbor, one of the best on the east coast, has quays and dry and wet docks, and affords accommodation to vessels drawing 19 feet. The principal exports are manufactured goods, agricultural produce, and fish; imports, timber and coal. The city was chartered in the twelfth century by David I and was made a royal burgh in 1352. Pop., 1901, 12,427; 1911, 12,666. Consult Mitchell, *History of Montrose* (Montrose, 1866).

MONTROSE, mŏn-trōz'. A city and the county seat of Montrose Co., Colo., 353 miles by rail southwest of Denver, on the Denver and Rio Grande Railroad and on the Uncompahgre and Gunnison rivers (Map: Colorado, B 3). It is in the Uncompahgre valley, a district made highly productive by irrigation, the government having completed the Gunnison Tunnel here, which is 6 miles long, and is engaged in farming, fruit growing, and stock raising. There are flour mills, a brick and tile plant, and municipally owned water works. Montrose has adopted the commission-manager form of government. Pop., 1900, 1217; 1910, 3254.

MONTROSE, mŏnt-rōz'. A borough and the county seat of Susquehanna Co., Pa., 46 miles north by west of Scranton, on the Lackawanna and the Lehigh Valley railroads (Map: Pennsylvania, K 2). It is known as a summer resort, having an attractive and elevated location, some 2000 feet above the sea, and contains a public library and an historical society building. There are creameries and manufactories of cut glass, boxes, sawing machinery, lumber, etc. Pop., 1900, 1827; 1910, 1914.

MONTROSE, mont-rōz', James Graham, first Marquis of (1612–50). He was the son of John, the fourth Earl of Montrose, and his family can be traced back to 1128. He studied at Glasgow and at St. Salvator's College, St. Andrews, and in 1626 succeeded to his father's earldom. After studying and traveling for some years he became involved in 1637 in the national movement, for Charles I had treated him coldly and the King's representative in Scotland, Hamilton, was vain and incapable. In 1638 was signed the National Covenant, which was to prevent the introduction of the Prayer Book and the ascendancy of the bishops in Scotland. In support of the Covenant, Montrose took up arms several times, until the Treaty of Berwick (June 18, 1639) put an end to the fighting. About this time Montrose met Charles I, and

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partly through his personal influence, and also because the Scottish Parliament had fallen under the control of the radical Presbyterians, Montrose became a supporter of the King, but changed sides again as a result of Charles's blundering policy. In May, 1641, however, he threw himself completely on the Royalist side. Argyll, the Governor of Scotland, was preparing to aid the English Parliament, yet Charles would not permit Montrose to begin an insurrection in Scotland until the Scots had actually begun the invasion of England in support of Parliament. Then, when it was too late, Montrose was appointed (1644) Lieutenant General of Scotland, and after he had made an unsuccessful inroad into Scotland from across the border he was created, on May 6, 1644, Marquis of Montrose. On August 18 he again entered Scotland, this time in disguise, and won six pitched battles over the Covenanters. Montrose's tactics and ability to meet changing conditions were a revelation to his enemies, but he was nevertheless unable to range the Lowlands on the royal side, and on Sept. 13, 1645, he was defeated at Philiphaugh by David Leslie; his army, composed of heterogeneous elements, melted away, and in 1646 Montrose escaped from the country to Bergen. He went to Paris, but could gain no support there. In 1649 Montrose again invaded Scotland, but was defeated at Invercarron on April 27, 1650, and ultimately fell into the hands of his enemies. He was executed on May 21, 1650. Montrose was an able man, of noble character; but as his armies were without discipline, he was unable to restrain their ravages, and his name and reputation have had to suffer in consequence. Consult: S. R. Gardiner, *The Great Civil War* (London, 1891); Mowbray Morris, *Montrose* (New York, 1892), in the "English Men of Action Series"; John Buchan, *The Marquis of Montrose* (ib., 1913).

MONTS, môn, Pierre du Guast, Sieur de (1560–1611). A French explorer and colonizer of Canada. He was born in Saintonge, France, of an Italian Roman Catholic family, but was converted to Protestantism and attached himself to Henry IV, who appointed him to an important office in the royal household. In 1603 the King made him governor of the French Company of Canada, which was given exclusive right to trade in furs between lat. 40° and 50° N. and the right to make land grants and govern the country, under the name of Acadia, with the title for himself of Vice Admiral and Lieutenant General. Taking with him Samuel Champlain, Poutrincourt, Biencourt, and Pontgrave as chief officers, he sailed from Havre, March 7, 1604. After exploring the Bay of Fundy they passed the winter on an island at the mouth of the St. Croix River, and in the summer of 1605 founded Port Royal on the present site of Annapolis. De Monts made Poutrincourt Governor of Port Royal, explored the Bay of Fundy, made Tadousac on the St. Lawrence his fur-trade depot, and returned to France. There he found that his monopoly had excited such lively opposition that his privileges had been withdrawn. He succeeded, however, in recovering a part on more specific conditions and continued to send out expeditions to Canada, and in the course of one of these Champlain founded the city of Quebec in 1608. After Henry IV's death, in 1610, De Monts's privileges were taken away, to his financial ruin. He died soon after in Paris. Consult: Francis Parkman, "Pioneers of France in the New World," in *France and England in North America*, part i (Boston, 1898), and *Tercentenary of De Monts' Settlement at St. Croix Island*, published by the Maine Historical Society (Portland, 1905).

MONT SAINT-MICHEL, môn săn-mē'shĕl'. A remarkable granite cone in the Bay of Cancale or Saint-Michel, off the coast of, and belonging to, the Department of Manche, France, near the mouth of the river Couesnon, here separating Brittany and Normandy, 6 miles southwest of Avranches. It was formerly isolated, but since 1879 a causeway three-quarters of a mile long connects the Mont with the mainland. Capped by an imposing mass of monastic buildings with a statue-tipped apex towering 233 feet above the level of the extensive bay, it forms the most striking feature in the landscape. The bay, left bare at low water, extends 8 miles from north to south, with a maximum width at its mouth of 15 miles, and is noted for its quicksands and the treacherous rapidity of its rising tides. The base of the Mont, 2 miles in circumference, is surrounded by sixteenth-century ramparts, towers, and bastions. A single gate gives admittance to a small village on the south slope, with mediæval houses, hostelries for pilgrims and travelers, an interesting museum, the famous Porte du Roi, Du Guesclin's observatory, and an ancient parish church. The village is built along a narrow, winding street which ends in a flight of steps leading to the summit crowned by the abbatial castle surmounted by a basilica or church with a lofty Gothic spire. The principal features of the abbey are the Crypte de l'Aquilon, almonry, cellar, and dungeons, dating from the twelfth century; the Crypte des Gros Piliers, the Salle des Chevaliers, the refectory, the graceful cloister, dormitory, and La Merveille, or north wall of the abbey, 246 feet long and 108 feet high, dating from the thirteenth century; and the châtelet, or donjon, and the Flamboyant Gothic church, dating from the fifteenth century. The Mont was the ancient Mons Tumba, an elevation, crowned by a temple of the Druids, in the Forest of Scissy, which was submerged by an inundation in the seventh century. The abbey was founded in 709 by St. Aubert, Bishop of Avranches. It became a noted pilgrimage resort and in the twelfth century was famous for its library and the learning of its monks, whose chronicles describe it as the "mons in periculo maris." The buildings date chiefly from after 1203, when the abbey was burned down by the soldiers of Philip Augustus. It successfully resisted the assaults of the English and Huguenots; was dismantled at the Revolution and converted into a political prison; and is now included among the historical monuments of France. Since 1863 it has been undergoing a process of restoration, not yet completed, which gives it a surprisingly fresh aspect. The building is the property of the Commission of Historical Monuments. Pop. (of village), 1901, 235; 1911, 232. See Carnac.

MONTS-DE-PIÉTÉ, môn-de-pyā'tā' (Fr., funds of pity). A name applied throughout Europe to public or semipublic institutions organized to loan money to the poor at low rates of interest on goods deposited. The establishment of the monts-de-piété dates from the middle of the fifteenth century, when a certain Barnabé Terni proposed a charitable bank which should lend money without interest. To

this was given the name Monte di Pietà. The principle was adopted by Orvieto (1460), Bologna (1475), and Milan (1496). At first no interest was charged, but as it was impossible to secure sufficient funds gratuitously, a moderate rate of interest was demanded. This policy was attacked on the ground that it violated the canon law forbidding usury. In 1515 the fifth Lateran Council declared that it was permissible to take a low interest to meet the necessary expenses. Cities in other countries soon adopted the plan. In 1534 a pawn bank was started at Ypres and one at Bruges in 1572, and by 1633 they existed in some 16 cities. Their success has not been uniform, but they now do a large business, controlling practically all pawnbroking in Belgium. The rate of interest varies from 4 to 16 per cent per annum. In Holland the first mont-de-piété, the Groote Banck van Leening, was established at Amsterdam in 1614. Financially the Dutch banks have not been profitable, as the constant endeavor has been to keep the rate of interest low. In Germany, Augsburg in 1591 appropriated funds to form a loan bank (Leihhaus), and in 1618 Nuremberg followed this example. To-day public pawnshops are found in many cities. The laws fix the interest at 2 per cent per month on all sums of less than 30 marks and 1 per cent per month on larger sums.

Monts-de-piété were introduced into France at Avignon (1577), Carpentras (1612), and Aix (1635). The famous Mont-de-Piété at Paris was established in 1777 by the General Hospital, which was to have the profits. It has had a varied history, but is in successful operation to-day. It has now a central station and over 20 auxiliary stations. Since the Revolution the pawnbroking business of France has been under the direct charge of the communal and city authorities. At the head of the Paris bank is the Prefect of the Seine with a special council of lawyers who form a comité consultatif and have charge of the legal work of the institution. The interest rate is now 6 per cent per annum. In Germany and Austria-Hungary municipal pawnshops do an extensive business, and in Spain the business is conducted with savings banks. In England a Charitable Corporation began business in 1708, but this was so mismanaged that it became a subject of parliamentary investigation and was closed. The principles of the monts-de-piété were introduced into the United States by the Collateral Loan Company of Boston in 1859; they have also been adopted by the Workingmen's Loan Association of Boston (1888), the St. Bartholomew's Loan Association of New York (1894), and many others. Among the Jews there exists the Hebrew Free Loan Association of New York, which loans money without interest.

The monts-de-piété have been of great service and have always tended to keep the rates of interest low. In all countries it is the custom to restrict the articles on which loans may be made and to take the necessary precautions against fraud and loss. If the pledges are not redeemed within a given time, the goods are sold. Sometimes the owner has the right to ask for the sale of the goods. It is usual to return to the owner any sum realized above the indebtedness.

Consult: Blaize, *Des monts-de-piété et des banques de prêts* (2d ed., Paris, 1856); Vanlaer, *Les monts-de-piété en France* (ib., 1895); Patterson, "Pawnbroking in Europe and the United States," in *Department of Labor, Bulletin No. 21* (Washington, 1899). See PAWNBROKER.

MONTSERRAT. A mountain in Spain. See MONSERRAT.

MONTSERRAT, mŏnt'sĕ-răt'. One of the Leeward Islands, British West Indies, situated 34 miles northwest of Guadeloupe and 26 miles southwest of Antigua (Map: West Indies, G 3). It is triangular in shape, 11 miles long by 7 miles broad, and has an area of 32 square miles. It is of volcanic origin, and its surface is mountainous, reaching a height of 3000 feet in the volcano of Souffrière. The chief products are sugar, coffee, cacao, arrowroot, and lime juice. Its industries received a heavy blow from a destructive hurricane which swept over the island in 1899. Montserrat is subject to the general government of the Leeward Islands and is locally governed by a nominated Legislative Council. Pop., 1901, 12,215; 1911, 12,196. The capital is Plymouth, on the southwest coast, with a population (1911) of 1534. The island was discovered in 1493 by Columbus and colonized by the British in 1632.

MONTT, mônt, JORGE (1846–1922). A president of Chile. He was a captain in the navy when, in January, 1891, the relations between President Balmaceda and the Chilean Congress reached the point of active hostilities, and the fleet under his leadership declared for Congress. On January 7 the fleet, with a number of Congressmen on board, sailed for Iquique, where a provisional government was formed under the direction of a junta composed of Montt, Waldo Silva, and Ramón Barros Luco. The army remained faithful to Balmaceda, but the majority of the people were hostile. The insurgents raised an army of 10,000 men and inflicted defeats upon the Balmacedists at Concón (August 21), and Placilla (August 28), both near Valparaiso. These victories brought Balmaceda's power to an end, and the provisional government, with Montt at its head, established itself in Santiago and called for the election of a new President and Congress. This election resulted in the almost unanimous choice of Montt for President, and under his administration the parliamentary régime was firmly established. The confidence thus shown in him was amply justified by his administration. He exerted himself to mend the breach made by the civil war and granted amnesty to all who had supported Balmaceda. During his term the army and navy were reorganized, the currency of the country was placed on a gold basis, and a large measure of local autonomy was granted to the municipalities. In foreign affairs he endeavored to settle the boundary dispute between Chile and Argentina by providing for the submission of the question to Great Britain, but in this he was not entirely successful. On Sept. 18, 1896, having completed the five years of his term of office, he quietly resigned the government to Federico Errazuriz, who had been elected his successor.

MONTT, MANUEL (1809–80). A Chilean statesman and president. He was educated for the legal profession in the National Institute at Santiago, of which he served as rector from 1835 to 1840. He began his political career as an official in the Ministry of the Interior in 1837. In 1840 he was elected member of the Chamber of Deputies, of which he was chosen President. The same year he was made Minister

of the Interior, in which position he managed the presidential election of General Bulnes. During the first term of Bulnes, Montt held various portfolios, rendering especially valuable service in that of Public Instruction by the establishment of the university and the normal school. As a member of the Chamber of Deputies and as councilor of government, he continued to exercise a dominant influence in politics in the second administration of Bulnes. In 1851 Montt was successful as the administration candidate for the presidency. The defeated Liberal candidate, General Cruz, at once headed an insurrection, but this was effectively crushed in the bloody battle of Loncomilla (Dec. 8, 1851). In 1856 Montt was elected for a second term of five years. During his two administrations he devoted his energies to the economic and social betterment of the country. He established railways and telegraphs, fostered steam navigation, encouraged immigration, aided in the revision of the civil code, and extended popular education. So effectively did he impress his character upon this period that it is known in Chilean history as the Decade of Montt. Opposition to the Montt-Varista party and agitation for an amnesty led to a serious revolt in 1859, the main purpose of which was to prevent the succession of Varas to the presidency. This, however, was suppressed after considerable fighting. During his later years Montt served as president of the Supreme Court and as professor in the faculty of law and political science at the University of Santiago.

MONTT, Pedro (1846–1910). A Chilean statesman and president, born in Santiago, the son of Manuel Montt. He studied law in the National Institute at Santiago and in 1872 was elected a member of the Chamber of Deputies, in which he held a seat for nearly 30 years. In 1885 he was chosen Speaker of the Chamber, in 1886 Minister of Justice and Public Instruction, and later Minister of Industry and Public Works. He was one of the leaders of the congressional opposition to President Balmaceda (q.v.), in 1890, and upon the overthrow of the latter was sent to Washington as Minister. Returning to Chile, he was named Minister of the Interior (1894), and by his activity and policy of conciliation during the years 1899–1902 he did much to avoid an armed conflict with Argentina. In 1901 he was the unsuccessful candidate of the coalition party for the presidency, but after the election he continued his efficient services to the government. Montt was elected President by an overwhelming majority, in 1906, on the National Union ticket, receiving the support of the Liberals, Radicals, Conservatives, and Democrats. He had always been the champion of sound finances, public economy, and a conciliatory foreign policy. It was expected, moreover, that his election would bring about administrative regeneration, putting an end to the excessive parliamentary control and restoring the executive to its proper position. He helped the country to recover from the earthquake, which occurred just after his inauguration, and to weather the ensuing financial crisis. During his administration the railways were extended, the number of public schools was increased, works of sanitation were begun in various cities, and irrigation projects were undertaken. He labored energetically against the debasement of the currency and, in 1909, vetoed a measure postponing from 1910 to 1915 the putting into operation of the conversion law. This, however, was passed over his veto by Congress, which still retained much of its power over the executive. One of his last acts was the approval of the submission to arbitration on the Alsop dispute with the United States. In 1910 he obtained a leave of absence in order to take medical treatment in Germany, visited the United States, and died upon the day of his arrival in Bremen.

MONTUCLA, môn'tü'klȧ', Jean Etienne (1725–99). A French mathematician, born at Lyons, and by profession a lawyer. He was employed by Jombert in 1765 to edit various scientific works, including *Récréations mathématiques d'Ozanam* (1778), and is chiefly remembered as author of the first great history of mathematics, the *Histoire des mathématiques* (2 vols., 1758; 2d ed., 1798; completed by Lalande and republished, 4 vols., 1799–1802). He published also *Histoire des recherches sur la quadrature du cercle* (1754; new ed., 1831).

MONTÚFAR, môn-tōō'fär, Lorenzo (1823–98). A Guatemalan jurist, politician, and author. He studied law and was admitted to the bar in 1845. He served as rector of the University of Costa Rica, was judge of the Supreme Court and Minister of Foreign Relations of Guatemala, practiced law for a while in Lima, and served as Minister to the United States, Peru, Spain, and elsewhere. He also did journalistic work, wrote books, was a judge, taught political economy, and participated in many revolutions. Among his published works are *Crítica del gobierno servil de Guatemala* (1854), *Memorias históricas de Centro América* (1881), and *Apuntamientos sobre economia política* (1887).

MONT'VILLE. A town in New London Co., Conn., 6 miles north of New London, on the Central Vermont Railroad (Map: Connecticut, G 4). It contains the Palmer Memorial Library. There are paper mills, cotton factories, and manufactories of bed quilts and building board. A considerable amount of water power is derived from the Oxoboxo River. Pop., 1900, 2395; 1910, 2804.

MONTYON, môn'tê-ôn' (sometimes incorrectly Monthyon), Antoine Jean Baptiste Robert Auget, Baron de (1733–1820). A celebrated French philanthropist. He became an advocate and was successively a counselor to the Grand Council, master of requests to the Council of State, and intendant of Auvergne, Provence, and La Rochelle. In 1775 he became a Councilor of State, and in 1780 he was appointed chancellor to Monsieur, the brother of the King. On the outbreak of the Revolution, Montyon emigrated, and resided first in Geneva and later in England, and did not return to France until the Bourbon Restoration. He did much, during this period, to help his brother émigrés. Throughout his whole life he was generous with his wealth, relieving the poor and founding prizes for the encouragement of invention and improvement in French arts and manufactures. Many of the prizes given by the Institute of France were founded or endowed by him, and he made large and munificent gifts to the hospitals and other charitable institutions of Paris. He was a prolific writer on historical, political, and economic subjects, but his works have become antiquated, and he is chiefly remembered for his philanthropy. Consult: Franklin, *Eloge historique de Montyon* (Paris,

1834); Dumoulin, *Montyon* (ib., 1884); L. Guimbaud, *Auget de Montyon* (ib., 1909). For the different prizes endowed by Montyon, see INSTITUTE OF FRANCE.

MON'UMENT (OF., Fr. *monument*, from Lat. *monumentum*, *monimentum*, memorial, from *monere*, to warn, admonish). 1. Anything made or erected to perpetuate the memory of persons or events. The earliest forms of monument are the cairn or pile of stones, the tumulus or mound, and the single stone or pillar. From these primitive types an immense variety of forms of commemorative structures has been developed, from the megalithic menhirs, dolmens, and cromlechs to the pyramids and obelisks of Egypt and such splendid modern works as the Victor Emmanuel Monument at Rome. The Monument, in London, is the common name of the column near London Bridge which commemorates the Great Fire of 1666. Bunker Hill Monument, in Charlestown, Mass., erected in 1846, is an obelisk-like shaft in memory of the Revolutionary battle of Bunker (Breed's) Hill. The Washington Monument is a similar but loftier shaft at Washington to the memory of the first President of the United States; it is 555 feet high. The chief kinds of monuments are described under their special names. See especially ARCH, TRIUMPHAL; BRASSES, SEPULCHRAL; MAUSOLEUM; MEGALITHIC MONUMENTS; MEMORIAL ARCHITECTURE; OBELISK; PYRAMID; SEPULCHRAL MOUND; TOMB; ETC. 2. The term is also used, by extension, of any important work of architecture or sculpture, such as a church, castle, palace, monastery, etc. 3. By further extension any important remains of a past time may be referred to as a monument, including literary remains, inscriptions, etc.; thus, the King James Version of the Scriptures is a literary monument of the Jacobean period.

MO'NUMEN'TA GERMA'NIÆ HISTOR'ICA (Lat., historical monuments of Germany). A great work on the antiquities of Germany, the chief source for the history of the Middle Ages. It was begun by the Gesellschaft für ältere deutsche Geschichtskunde, founded in 1819, and after that body was dissolved the Prussian Academy of Sciences assumed charge of the enterprise, to which the German and Austrian governments gave financial support. The work proceeds under various divisions—historians, laws, archives, documents, letters, chronicles, and antiquities—of which 47 volumes were issued up to 1874. Since 1876, 20 volumes of a *New Archives* have been in publication. The first volume was published in 1826 by the Hahnsche Hofbuchhandlung in Hanover under the direction of Pertz, who was succeeded in 1874 by Waitz, and after his death in 1886 by Dümmler.

MONUMENTAL CROSS. See CROSS.

MON'UMENT PARK. A small park in El Paso Co., Colo., north of Colorado Springs, that is remarkable for its natural stone columns, which rise from its floor in great numbers. The columns are composed of sandstone in horizontal layers and bear on top, 15 to 25 feet from the base, a cap of hard ferruginous sandstone which sometimes joins two or more of the shafts into a group. They have been sculptured by the erosive processes into various shapes, some showing resemblance, more or less fanciful, to human forms, as in the Dutch Wedding. (See illustration accompanying EROSION.) It is the presence of the harder sandstone above the softer layers that has protected the latter and led to the formation of the columns.

MO'NUMEN'TUM AN'CYRA'NUM. The name given to the great inscription found at Ancyra (modern Angora, q.v.) describing the career of Augustus.

MONVEL, mōn'vĕl'. The assumed name of JACQUES MARIE BOUTET (1745–1812). A French actor and dramatist, father of the famous Mesdemoiselles Mars (q.v.). He made his appearance on the stage of the Comédie Française in 1770. He was the author of some successful plays, among them *Les victimes cloîtrées*, in which he gave expression to his sympathy with the principles of the Revolution.

MONVEL, LOUIS MAURICE BOUTET DE (1850–1913). A French genre and portrait painter and illustrator, born in Orléans. He studied under Cabanel and other Classicists at the Ecole des Beaux-Arts and, after the War of 1870–71, with Carolus Duran. He began to exhibit portraits in 1873 and afterward won several medals, notably a gold one at the Paris Exposition (1900); but meanwhile he took up illustrating. Soon his individual, unmistakable style showed itself in the drawings he made for the French edition of *St. Nicholas* (1878), for *Chansons et rondes* (1883), *Chansons de France* (1884), *Nos enfants* (1886), *La civilité puérile*, the fables of La Fontaine (1888), and the exquisite black and white work in Fabre's *Xavière* (1890). His work is usually done in flat tones and is exceedingly decorative in quality. His technical training made him a faultless draftsman. The decision and beauty of his line, his strong, clear color, the charm and naïveté of his delineation of child life, have made him a conspicuous figure in this field of illustration. His "Jeanne d'Arc" (1897) is a masterpiece of composition. He also did six canvases, representing the history of the Maid, for the memorial church at Domrémy; these were widely exhibited in the United States. Another series of great beauty, on the same theme, is owned by Senator W. A. Clark. His portraits, particularly those of children and notably the daughter of Madame Réjane, are well known in America and rank among the highest. His large pictures, which include "The Apotheosis" (1884), an episode of the Commune, are less interesting. At the time of his death he was occupied with illustrations of the "Life of St. Francis of Assisi." Consult: *Modern French Masters*, edited by Van Dyke (New York, 1896); W. H. Downes, *Twelve Great Artists* (Boston, 1900); Vandoyez, in the *Gazette des Beaux-Arts*, vol. lv (Paris, 1913).

MONYPENNY, mŭn'ĭ-pĕn'ĭ, WILLIAM FLAVELLE (1866–1912). A British journalist and author, born in County Armagh, Ireland. In 1888 he graduated from Trinity College, Dublin. He was a contributor to the *Spectator* in 1891–93 and assistant editor of the *Times* in 1894–99. In the latter year he was appointed editor of the Johannesburg *Star*, which was suspended during the South African War and resumed under Monypenny's direction in 1902, but he resigned the editorship in 1903. During the war he held a commission with the Imperial Light Horse and in 1900–01 was director of civil supplies to the military governor of Johannesburg. In 1908 he became director of the London Times Publishing Company. He published *The Two Irish Nations: An Essay on Home Rule* (1913) and *The Life of Benjamin Disraeli, Earl of Beaconsfield* (3 vols, 1910–14),

the third volume of which (for the period 1846–55 of Disraeli's life) was prepared by George Earle Buckle after Monypenny's death.

MONZA, mŏn'tsȧ. A town in the Province of Milan, Italy, on the Lambro, 10 miles north-northeast of Milan (Map: Italy, B 2). The cathedral of St. John the Baptist, founded in the sixth century by Queen Theodolinda and rebuilt in the fourteenth century, contains interesting memorials of the Queen and the famous Iron Crown of Lombardy (q.v.). Other notable buildings are the church of Santa Maria in Istrada, the Gothic town hall, and the palace, the summer and autumn residence of the royal family, situated in beautiful grounds traversed by the Lambro. Its institutions include a Gymnasium, a lyceum, a technical school, and a school of industry. The town has manufactures of silk, cotton, and woolen goods, hats, leather, machines, dyestuffs, books, and church organs. It is surrounded by a fertile district, which yields abundance of grain, fruits, and wine. Monza, the ancient Modicia, has been the residence and coronation town of the kings of Lombardy since the eleventh century. It was once conspicuous for its wealth and the extent of its cloth trade. Here on July 29, 1900, King Humbert of Italy was assassinated. Pop. (commune), 1901, 42,599; 1911, 53,214.

MONZIE-LASSERRE, Paul Joseph Henri de. See Lasserre, P. J. H. de Monzie-.

MOOD (AS. *mōd*, OHG. *muot*, spirit, courage, Ger. *Mut*, courage, Goth. *mōds*, wrath; possibly connected with Gk. *μαίεσθαι*, *maiesthai*, to desire, OChurch Slav. *sŭmēti*, to dare). A weak emotion, usually of long duration. The mood, like the emotion, is made up of ideas and affection; but it does not centre about a "situation" as the emotion does. The emotion of fear, e.g., always has its object. One fears an enemy, an approaching storm, a ruined reputation. But in a mood all sorts of mental processes may demand the attention in turn and in turn pass out of consciousness, while the mood remains as a vague background to them all. In other respects, however, the mood has the characters of an emotion; the mood of cheerfulness is similar to the emotion of joy, depression to sorrow, irritability to anger, apprehension to fear; and mood, like emotion, is largely an organic consciousness. The older psychology classified acquiescence, mild surprise, expectancy, etc., as moods; but recent work upon the psychology of thought has assigned them to a separate category of "conscious attitudes." See Thought. Consult: James Sully, *The Human Mind* (New York, 1892); Oswald Külpe, *Outlines of Psychology* (ib., 1909); E. B. Titchener, *Textbook of Psychology* (ib., 1910); Wilhelm Wundt, *Physiologische Psychologie* (Leipzig, 1911).

MOOD. See Grammar; Logic.

MOO'DIE, Susanna (1803–85). A Canadian author. She was born at Bungay, Suffolk, England, her father being Thomas Strickland, Beydon Hall. Her sisters, Agnes Strickland (q.v.), Mrs. Katherine Parr Traill, Elizabeth and Jane Strickland, were authors. She married J. W. D. Moodie, a British officer, in 1821 and in 1832 emigrated with her husband to Upper Canada (Ontario), settling first near Port Hope and shortly afterward in the backwoods north of Peterborough, where she remained eight years. In 1839 she removed to Belleville, and later to Toronto, where she died. She began to write at a very early age, contributing to periodicals short poems and tales for children; and later she wrote poems, novels, and works describing conditions of Canadian life. Her publications include: *Enthusiasm* (1830), a book of poems; *Roughing It in the Bush* (1852), her best-known work, describing her pioneer life; *Life in the Clearings* (1853); *Mark Hurdlestone, the Gold Worshiper* (2 vols., 1853); *Matrimonial Speculations* (1854); *Flora Lindsay* (1854); *Geoffrey Moncton, or the Faithful Guardian* (1856); *Dorothy Chance* (1867).

MOODS, in Logic. See Syllogism.

MOO'DY, Agnes Mary (Claypole) (1870–). An American biologist, born at Clifton, Bristol, England. She graduated from Buchtel College, Ohio, in 1892, from Cornell (M.S.) in 1894, and from the University of Chicago (Ph.D.) in 1896. In the latter year she became instructor in zoölogy at Wellesley and in 1898 assistant in histology and embryology at Cornell. From 1901 to 1903 she was instructor in zoölogy and geology at Throop College. She was married to Robert Orton Moody. Her special contributions to journals of applied microscopy and morphology were on the histology of the Cayuga Lake lamprey and on the embryology of *Anurida maritima*.

MOODY, Dwight Lyman (1837–99). An American evangelist. He was born at Northfield, Mass., Feb. 5, 1837. At the age of 17 he became clerk in a shoe store in Boston. In 1856 he removed to Chicago, became active in mission work, and established a Sunday school which numbered over 1000 children. During the Civil War he was employed by the Christian Commission and subsequently as city missionary in Chicago by the Young Men's Christian Association. A church was built for him and, though unordained, he became its pastor. The building was destroyed by the fire of 1871, but a new one was erected to hold 2500 persons. In 1873 he visited Great Britain and Ireland with Ira D. Sankey, the singer, and in 1875 held a long series of meetings in Brooklyn and Philadelphia, and in 1876 in New York. Similar services followed in many large cities throughout the country. In 1882 a second visit to England was made. Most of his work was done in the provinces, but he held large meetings also at the universities of Oxford and Cambridge. He also held meetings at Paris. His later years were applied to the building up of a seminary for young women at Northfield, Mass., a training school of Christian workers in Chicago, and the Mount Hermon School for Boys at Gill, near Northfield. He died at Northfield, Dec. 22, 1899. Many of his sermons were published. Consult his biography by his son (New York, 1900).

MOODY, Granville (1812–87). An American Methodist Episcopal clergyman, born at Portland, Me., and self-educated. He entered the ministry in 1833, joining the Ohio conference. When the Civil War broke out he resigned his pastorate and entered the army as colonel of the Seventy-fourth Ohio Volunteer Infantry, which he had organized. In 1865 he was brevetted brigadier general of volunteers. His brother was a colonel in the Confederate army. Moody was an ardent temperance advocate. He was a member of the General Conferences of 1852, 1860, 1864, and 1876. His writings include *Popery and its Aims* (1875) and *A Life's Retrospect—Autobiography*, edited by Sylvester Weeks (Cincinnati, 1890).

MOODY, James (1744–1809). An American

Loyalist, born in New Jersey. In 1777 he joined the British, and for several years he was very active as a partisan leader and as a remarkably fearless and resourceful spy, performing many daring exploits in Pennsylvania and New Jersey, capturing Revolutionary officers and soldiers and intercepting dispatches. At the close of the war he went to England, and later settled in Nova Scotia. In reward for his services the English government gave him the half pay of a lieutenant and an estate. An account of his adventures, entitled *Lieutenant James Moody's Narrative of his Exertions and Sufferings in the Cause of Government since 1776,* was published in London in 1783 and in New York in 1865.

MOODY, JOHN (1868–). An American financial writer. He was born in Jersey City and was early engaged in newspaper work. From 1890 to 1900 he served in various capacities with the banking house of Spencer Trask & Co. He founded in 1900 and was editor until 1907 of *Moody's Manual of Railroads and Corporation Securities;* founded in 1905 and thereafter was editor of *Moody's Magazine,* an investor's monthly; and established in 1909 the reference publication, *Moody's Analyses of Railroad Investments,* and in 1914 *Moody's Analyses of Investments,* dealing with public utilities and industrials. He became known as a lecturer on investment values. His writings include: *The Truth about the Trusts* (1904); *The Art of Wall Street Investing* (1906); *The Investor's Primer* (1907; 3d ed., revised, 1912); *Masters of Capital in America* (1911); *How to Analyze Railroad Reports* (1912).

MOODY, WILLIAM HENRY (1853–1917). An American public official and jurist. He was born in Newbury, Essex Co., Mass., graduated at Phillips Academy (Andover, Mass.) in 1872 and at Harvard in 1876, and studied law in the office of Richard H. Dana. From 1890 to 1895, while district attorney for the Massachusetts Eastern District, he carried through successfully the prosecution of boodling aldermen in the city of Lawrence. In 1895 he was elected by the Republican party to fill the vacancy in the House of Representatives caused by the death of General Cogswell, and he was thrice reëlected. As Congressman he made a reputation by his knowledge of parliamentary procedure and by his perseverance in debate. As a member of the Committee on Appropriations he had special charge of the Sundry Civil Appropriation Bill. He was regarded as a very able man. In 1902, on the resignation of J. D. Long, President Roosevelt appointed him Secretary of the Navy. His service continued until 1904, when he was made Attorney-General. In 1906 he was appointed Associate Justice of the Supreme Court, but because of prolonged ill health he was retired by special Act of Congress in 1910.

MOODY, WILLIAM VAUGHAN (1869–1910). An American poet and playwright, born at Spencer, Ind. Graduating from Harvard University in 1893, for two years he taught English at Harvard and Radcliffe, leaving Cambridge to be instructor (1895–1901), and then (1901–07) assistant professor, of English and rhetoric at the University of Chicago. He received the degree of Litt.D. from Yale in 1908, and was a member of the American Academy of Arts and Letters. As a poet he was perhaps the most promising man of his day in America. This aspect of his work is represented by the lyrical drama *The Masque of Judgment* (1900), *Poems* (1901), and *The Fire-Bringer* (1904). In the drama he is at his best in *The Great Divide* (1907), which was a great success on its first appearance and remains one of the best American plays. His *The Faith-Healer* (1909) is also noteworthy in the drama of its day, though below the standard of its predecessor. As a part of his literary accomplishment are to be reckoned his *History of English Literature* (1907), in collaboration with R. R. Lovett, and several editions of the English classics, notably *Milton's Poems* (1899) in the "Cambridge Poets." His early death was lamented as a misfortune to American letters.

MOODY BIBLE INSTITUTE OF CHICAGO. An institution for Bible training founded in 1886 by Dwight L. Moody. The general purpose of the institute is the training of Bible teachers and missionaries. It is not endowed, but is maintained by the gifts of Christians all over the world. While in training a large percentage of the students are compelled to work a few hours each day in order to meet their expenses. In 1914 there were enrolled in the day classes 837 students representing 30 denominations, 38 States, and 30 foreign countries. In the evening classes 429 students were enrolled and in the correspondence departments 1567. The extension department enrolls hundreds of thousands throughout the United States and Canada by means of various conventions, evangelistic meetings, and correspondence courses. In 1915 the faculty contained 29 members. Since foundation the institute has enrolled 13,000 students in its three departments of instruction. Over 700 have entered the foreign-mission fields under the several denominational boards, while thousands are engaged in various Christian activities in the United States.

MOOGHA, mōō′gȧ. See SILKWORM.

MOOLTAN, mōōl-tän′. A city of British India. See MULTAN.

MOON (AS. *mōna,* Goth. *mēma,* OHG. *māno,* Ger. (with excrescent *d*) *Mond,* moon; connected with Lith. *menu,* moon, Gk. *μήν, mēn,* month, Skt. *mās,* moon, month, probably from Skt. *mā,* to measure, and ultimately connected with Eng. *month*). The satellite of our earth, revolving round the earth from west to east in a period of one month (q.v.) and accompanying the earth in its motion round the sun.

Phases of the Moon. The first peculiarity about the moon is the constant and regular change of her illuminated surface from a thin crescent to a circle, and vice versa, and a corresponding change in the time of her appearance above the horizon. These changes depend upon the position of the moon relative to the earth and the sun, for it is only the half of the moon facing the sun that is illuminated by his rays, and the whole of this illuminated portion can be seen from the earth only when the sun, earth, and moon are nearly in a straight line (the line of *syzygies*) and the earth is between the sun and moon. When the moon is in the line of syzygies, but between the earth and the sun, no part of her illuminated disk can be seen from the earth. In the former case the moon is said to be *full,* and in the latter, *new.* A few days after new moon the moon appears to be a little to the east of the sun as a thin crescent, with the horns pointing to the east, and as she increases her angular distance from the sun at the rate of about 12° daily, the crescent of light

THE MOON, FIRST QUARTER
From a Photograph by Loewy and Puiseux

becomes broader till, after the lapse of a little more than seven days, at which time she is 90° in advance of the sun, she presents the appearance of a semicircle of light. The moon is then said to have completed her first quarter. Continuing her course, she becomes gibbous; and at the fifteenth or sixteenth day from the new moon attains a position 180° in advance of the sun, and now presents the appearance known as full moon. From this point she begins to approach the sun, again appearing gibbous, and after a third period of more than seven days reaches a point 90° west of the sun and enters her last quarter. Here, again, she appears as a semicircle of light, the illuminated portion being that which was not illuminated at the end of the first quarter. The moon, now rapidly approaching the sun, resumes the crescent form, but this time with the horns pointing westward, the crescent becoming thinner and thinner, till the moon reaches the position of new moon and disappears. The earth as seen from the moon presents similar phases, and has consequently, at the time of new moon, the appearance of a round illuminated disk, and at full moon is invisible. This explains the peculiar phenomenon occasionally observed when the moon is near the sun (either before or after the new moon), of the part of the moon's face which is unilluminated by the sun appearing faintly visible, owing to the reflection upon it of strong earth light. This phenomenon is often called the new moon in the old moon's arms. At new moon the moon comes above the horizon about the same time as the sun, and sets with him, but rises each day about 50 minutes later than on the day previous, and at the end of the first quarter rises at midday and sets at midnight, continuing to lag behind the sun. When full she rises about sunset and sets about sunrise, and at the commencement of her last quarter she rises at midnight and sets at midday. The daily retardation of the moon's rising, just stated to be about 50 minutes, is subject to considerable variations. In the latitude of New York it may range from 23 minutes to 1 hour, 17 minutes. See HARVEST MOON.

Distance and Magnitude. From repeated observations of the moon's horizontal parallax (q.v.) and of the occultations by her of the fixed stars, her mean distance from the earth has been estimated at 238,840 miles and her mean angular diameter at 31′ 7″ and her actual diameter as 2163 miles, or about $\frac{3}{11}$ of the earth's diameter. Her actual distance from the earth may vary from 252,972 miles at apogee to 221,614 at perigee. Her volume is about $\frac{1}{49}$ that of the earth, her density 0.62 (that of the earth being taken as unity), and her mass $\frac{1}{81.5}$ of the earth's mass.

Orbit. The moon revolves round the earth in an elliptic orbit with the earth in one focus, the eccentricity of the ellipse being 0.05491, or more than 3¼ times that of the earth's orbit. The plane of her orbit does not coincide with the ecliptic, but is inclined to it at an angle of 5° 8′ 40″, and intersects it in two opposite points, which are called the nodes. (See NODE.) Were the moon's orbit a true ellipse, which, owing to various irregularities known as perturbations (q.v.), it is not, the lunar theory (q.v.) would be exceedingly simple; but these perturbations cause in the case of the moon a distinct and well-marked deviation from her previous course in a single month. The regression of her nodes along the ecliptic causes a continual change in the plane of her orbit, so that if, during one revolution round the earth, she occults certain stars, at the next revolution she may pass to one side of them, and will remove farther and farther from them in each successive revolution. Owing to this continual change of her orbit, the moon in course of time passes over or occults every star situated within 5° 24′ of the ecliptic. The motion of the nodes is so rapid that they perform a complete circuit of the orbit in 18.6 years. Another important change in the moon's orbit is the revolution of the line of apsides (q.v.), by which the perigee and apogee are continually changing their position relative to the earth and sun. This revolution is more than twice as rapid as that of the nodes, being performed in 8.85 solar years. This motion is analogous to the perturbations of planetary orbits, and its nature and origin are treated in the article PERTURBATIONS. Its effect upon the moon is to produce a variation in her distance from the earth, independent of that produced by her elliptic motion. Among the further disturbances or perturbations of the lunar orbit we may mention the evection (q.v.), which may displace the moon's position in the sky 1° 16′ 27″, the variation, which may amount to 39′ 31″, and the annual equation, whose maximum is 11′ 9″. See LUNAR THEORY.

Eclipses. As the moon in her course passes the sun once every month, and also places the earth between herself and the sun once a month, it is evident that if she moved in the plane of the ecliptic there would be either a total or an annular eclipse of the sun and a total eclipse of the moon every month. The inclination of her orbit, allowing her to pass the sun 5° 9′ to the north or south of his track, prevents such a frequent occurrence of eclipses. See ECLIPSE.

Rotation. The moon rotates on her axis with a velocity such that one complete revolution occupies precisely the time needed for one revolution of the moon around the earth. As a consequence of this, the moon always turns the same side towards us, and we see only one-half her surface plus a small additional amount brought into view by libration (q.v.).

Physical Features. The surface of the moon, as seen from the earth, presents a most irregular grouping of light and shade. The dark portions were named by the earlier astronomers as seas, lakes, etc., and still retain these names, although there is strong evidence against the supposition that the moon, or at least that portion of it presented to us, contains any water. The brighter parts of the moon are mountainous, as is proved by the fact of their casting shadows when the sun's rays fall upon them obliquely, and also by the ragged appearance presented by the interior illuminated border of the moon, an appearance which can only be satisfactorily accounted for on the supposition that the surface of the moon is not level, in which case the higher portions will be illuminated some time before the light reaches the level parts; and it is observed that as the illumination proceeds bright spots start up in advance of it, and when the moon is on the wane these same spots continue to shine for some time after the surrounding surface is immersed in gloom. The mountains occur either singly, when they are generally of a circular form and are called *craters*, or in groups, which are mostly annular and form a sort of wall inclosing a deep de-

pression or plain in which are situated one or more conical mountains. The craters are not infrequently 8 or 10 miles in diameter, and some measure more than 100 miles across. The principal mountains attain an altitude of about 20,000 feet, according to a micrometric measurement of the length of their shadows. The moon everywhere presents traces of volcanic agency, but no active volcanoes have yet been discovered, nor is there any sign of recent volcanic action. Through the telescope she presents a desolate appearance, without indications of animal or vegetable existence. She appears to be devoid of an atmosphere, or, if one exists, it must be of exceeding rarity, or else concentrated into cavities within the moon's rocky surfaces. Probabilities are in favor of a low surface temperature, not higher, perhaps, than that of ordinary ice. (For the influence of the moon upon terrestrial tides, see TIDES.) Recent theorists hold that very large lunar tides, caused by the earth, existed many thousands of years ago, when the moon was still in a semiplastic condition. This tidal theory can be made to account for the remarkable coincidence of the lunar axial rotation period with that of her revolution round the earth. The best lunar map based upon visual observations is that of Beer and Maedler, which was published in 1837. In 1904 Pickering published his *Photographic Atlas of the Moon* and the elaborate *Atlas photographique de la lune* of Loewy and Puiseux, begun in 1896, was completed in 1908.

Superstitions Regarding the Moon. The moon was anciently an object of worship and has remained to the present day the centre of many superstitions. The times for killing animals for food, gathering herbs, cutting down wood for fuel, sowing seeds of various kinds, were all regulated by the age of the moon. There were similarly defined periods for taking particular medicines and attempting the cure of particular diseases. In northern European countries the waning moon has been considered to have an evil influence, and full or new moon to be the most auspicious season for commencing any enterprise. Farmers and sailors still believe in the influence of changes in the lunar phases on the weather. See ASTRONOMY; SUPERSTITION.

Bibliography. Elger, *The Moon* (London, 1895); Franz, *Die Figur des Mondes* (Königsberg, 1899); W. H. Pickering, *The Moon* (New York, 1903); Nasmyth and Carpenter, *The Moon as a Planet, a World, and a Satellite* (London, 1903); Phillip Fauth, *The Moon in Modern Astronomy* (New York, 1907); G. P. Serviss, *The Moon* (ib., 1907).

MOON, MOCK. See MOCK MOON; HALO.

MOON, WILLIAM (1818–94). An English philanthropist, born in Horsemonden, Kent. He was educated in London and in 1840 gave up his studies for the Church because of total blindness. Moon started a school for blind children and, finding that previous systems were too complicated, devised an embossed type for the use of the blind with only nine letters, which, by variation of position, made up a complete alphabet. Following the same method, he published pictures and maps for the blind. Moon traveled in Europe and in the United States (1882) and established loan libraries of his books and schools for home instruction. All his philanthropic efforts were largely tinged with evangelistic methods. He published *Sight for the Blind* (1873), which gives the history of his system. Consult Rutherford, *William Moon and his Work for the Blind* (London, 1898). See BLIND, EDUCATION OF THE.

MOONBILL. A local name in the United States for the ring-necked scaup duck. See SCAUP.

MOON'EY, JAMES (1861–). An American ethnologist, born at Richmond, Ind. In 1885 he became connected with the Bureau of American Ethnology at Washington. His first labor in Indian ethnography, which had occupied him since boyhood, was a tribal list containing 3000 titles. He discovered the Cherokee ritual, studied the ghost dance in 1890, and later the Kiowas. His writings include: *Myths of the Cherokees* (1888); *Sacred Formulas of the Cherokees* (1891); *Siouan Tribes of the East* (1894); *The Messiah Religion and the Ghost Dance; Calendar History of the Kiowa Indians* (1898). He was a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA.

MOONEYE, LAKE HERRING, or WHITING. Names applied to the cisco (q.v.) or whitefish.

MOONFISH (so called from its shape). 1. A fish of the family Carangidæ, allied to the pompanos and having compressed, oval, silvery bodies. The species (*Selene vomer*), called jorobado, look down, horsehead, and horsefish, is numerous on both coasts of the warmer parts of America and grows to a foot or more. It passes through a remarkable series of transformations in growth, being so thin when young as to be useless for food, though well liked as a pan fish when adult. (See Plate with article HORSE MACKEREL.) 2. A closely related fish (*Vomer setipennis*), known about New York as blunt-nosed shiner, and highly esteemed as food. Some other species are known, but their habits and manner of breeding remain obscure. 3. The opah (q.v.).

MOONFLOWER. See IPOMŒA.

MOON'GA, or **MOOGHA.** See SILKWORM.

MOONJA, mōōn'jȧ, **MUNJAH, MOONYAH,** SARA, or SHUR (Anglo-Ind., from Skt. *muñja*, reed), *Saccharum sara*. An East Indian grass of the same genus as the sugar cane, growing on the banks of the Ganges and the Indus. The leaves yield a tough fibre, not thoroughly tested, but used for making rope.

MOONLIGHT SONATA, THE. A sonata by Beethoven (1802). It is the second of two sonatas forming Opus 27, C sharp minor, *Sonata quasi una fantasia*, dedicated to Countess Guicciardi. The imaginary title is probably due to Rellstab's likening the first movement to boating on Lake Lucerne by moonlight.

MOONSEED, YELLOW PARILLA (so called from the crescent-shaped seeds), *Menispermum canadense*. A North American climbing plant of the family Menispermaceæ, with peltate, roundish-cordate, and angular leaves, small clusters of white flowers, and black, kidney-shaped fruits. The cylindrical root, which attains a length of several feet and a diameter of a quarter of an inch, was formerly known in commerce as Texas sarsaparilla. It contains berberin, resin, tannin, etc., and has tonic, alterative, and diuretic properties.

MOONSHINERS. This term is a colloquialism applied in the United States to persons who manufacture illicit whisky. The scope of its application has come to be restricted usually, however, to those who reside in or near the Appalachian Mountain Range, though it is still

employed generally concerning those who make such liquor. Moonshiners of modern times come most frequently from the mountainous parts of Kentucky, Tennessee, West Virginia, Virginia, North Carolina, Georgia, and Alabama; and they are most active in Kentucky, Tennessee, and North Carolina. The whisky they produce is usually made from corn, although rye and barley, as well as peaches for brandy, are sometimes used. It is sweetened commonly, if at all, with molasses, and is called "mountain dew," possibly because of the colorless, crystalline appearance of corn whisky.

The unproductivity of the rocky soil and the absence of variety in the possible occupations have tended to make the manufacture of whisky the most profitable means of disposing of the scanty harvests, particularly if that disposition can be effected without paying the Federal tax. To the mountaineer the revenue laws are an invasion of his natural right to utilize and sell his property—a feeling which to him removes moral stigma from his chosen business. This philosophy and practice, however, have involved him in perennial struggle with the revenue officers. This conflict may be said with historical accuracy to have begun in the United States with the passage of the Alexander Hamilton Excise Law of 1791. The differences between the Pennsylvania farmers and the Washington administration about this law led finally to the so-called Whisky Insurrection of 1794, in which the government encountered an armed organization. The result then demonstrated that organized and public opposition to the law was futile; so distillers thenceforward resorted to secrecy and evasion. Although the excise law, which was opposed by public opinion, was repealed during the Jefferson administration, moonshining appeared again when the law was reënacted. The generally accepted idea of the mountaineer moonshiner is that he is secretive and suspicious of outsiders until his confidence is won, on which he becomes a generous and faithful friend, hospitable to the limit of his resources. In his seclusion and ignorance he has evolved peculiar social customs and sanctions, together with a dialect, of his own; and he is of a blood singularly unmixed with foreign elements. One seemingly ineradicable characteristic of the life is the feud, which is often conducted with savagery and implacable hatred, becoming an hereditary legacy of families and clans. The origins of such blood wars are probably too numerous for comprehension, but one fruitful cause lies in the practice of individuals of giving information respecting the illegal distilleries of their enemies to the revenue officials, which provokes reprisals. The family of the man injured, however much it may disapprove of his conduct, considers it necessary to assume his quarrel. Such has been said to have been one of the causes of the famous Breathitt County War in Kentucky.

The Commissioner of Internal Revenue reported in 1913 that "illicit distilling continues with slight abatement" and that in that fiscal year 2375 stills were seized. Of these, 2120 were located in the States mentioned above. The forces of civilization, i.e., of law and education, together with the approach and multiplication of modern industries, have slowly invaded the moonshiner's domain; and he, learning new and more profitable occupations, has been thought to be abandoning his unlawful business. But it is impossible to predict with certainty when these forces will eventually triumph.

MOON SNAKE. A Brazilian colubrine venomous snake of the genus *Scytale*. They are of small size and dull colors. Some of them are arboreal, others fully terrestrial. They hunt almost exclusively at night and feed mainly on lizards. Although their fangs (see OPISTHOGLYPHA) are large, these reptiles seem never to attack human beings.

MOONWORT. A fern. See BOTRYCHIUM.

MOONYAH. See MOONJA.

MOOR, MOORING (probably from Dutch *marren*, to tie, moor, hinder, retard, AS. *mirran*, *myrran*, *merran*, OHG. *marrjan*, *marren*, dialectic Ger. *marren*, to entangle, Eng. *mar*). To moor a vessel is to secure it with ropes or chains to anchors or to a wharf or to the buoys of permanent moorings. The common method of mooring with two anchors is to drop one anchor, veer chain to 60, 75, or 90 fathoms and let go the other, and then heave in on the long chain and veer on the shorter until lying with both chains equal, or with one about 15 fathoms shorter than the other. This method is generally resorted to when the anchorage ground is contracted and there is insufficient room for a ship to swing about a single anchor with a full scope of chain. In many harbors, where the anchorage space is limited, permanent moorings are laid down. These usually have buoys to which the anchor chains are attached, the ship being secured to the buoy by a hawser or short length of chain. In many European roadsteads the buoys are of no greater size than is necessary to support light chains which are attached to the real mooring cable. The light chain is used to haul the upper end of the main cable on board the ship, where it can be secured. The lower end of the cable is shackled to the ends of others leading along the bottom to the anchors, two to four in number, placed at the corners of a square or triangle or up and down stream. See ANCHOR; HAWSE; MOORING SWIVEL.

MOOR. Wet land, with peaty soil, possessing a vegetation in which mosses are usually conspicuous. Two types of moor are distinguished, the one characterized by the presence of the peat mosses or sphagnums, and on account of the tendency of this plant to grow in thick soft masses above the surrounding areas often called high moor; the other without sphagnum, known as low moor. In America high moors are usually called bogs (see BOG). Low moor is also known as meadow moor, sedge moor, swamp meadow, or fen. Here sphagnums are nearly or quite absent, although other mosses are found which contribute to the scanty peat. The bulk of the vegetation is usually made up of a variety of grasses and sedges with the addition of various herbs and such shrubs as low willows, alders, and dwarf birches, the last being more abundant at high altitudes and in northern areas. Low moors are easily transformed into tillable land that is often of excellent quality on account of the sufficient but moderate amount of peat and humus. Often upon the removal of the surplus water by drainage rich farm lands are at once available for tillage. See BOG; PEAT; SPHAGNUM; SWAMP.

MOOR, EDWARD (1771–1848). An English writer on India. He entered the service of the East India Company in 1782, but in 1790 joined the army. He retired in 1806 on a special pension and a large grant as a reward for his

bravery and for a *Digest of the Military Orders and Regulations of the Bombay Army* (1800). Moor's most valuable book was the *Hindu Pantheon* (1810; new ed. by Simpson, Madras, 1864), which is still an authority because of its unique illustrations. His *Oriental Fragments* (London, 1834) is also worthy of note.

MOOR BLACKBIRD. See RING OUZEL.

MOOR'CROFT, WILLIAM (c.1765–1825). An English veterinary surgeon and traveler, born in Lancashire. He studied medicine in Liverpool, but subsequently devoted himself to veterinary surgery. In 1808 he became veterinary surgeon to the Bengal army and superintendent of the East India Company's stud at Pūsá, near Cawnpore. While occupying these positions he undertook a series of remarkable journeys in northern India, was the first Englishman to cross the Himalayas, vainly endeavored to penetrate Chinese Turkestan, and died while returning from Bokhara. His papers were edited by Prof. H. H. Wilson and published in 1841 under the title *Travels in the Himalayan Provinces of Hindustan and the Punjab from . . . 1819 to 1825.* Among his other writings is a translation of Valli's *Experiments in Animal Electricity* (1793).

MOORE, ADDISON WEBSTER (1866–). An American philosophical scholar, born at Plainfield, Ind. He graduated from DePauw University (A.B., 1890; A.M., 1893); studied at Cornell (1893–94); and took his Ph.D. in 1898 at the University of Chicago, with the faculty of which he had been connected for three years, and where he remained, becoming professor of philosophy in 1909. Moore was president of the Western Philosophical Association in 1911. For some years he was associated with John Dewey, to whose philosophical ideas he gave his support. See PRAGMATISM; EMPIRICISM. His writings include: *Functional versus Representational Theories of Knowledge in Locke's Essay* (1902); *Existence, Meaning, and Reality in Locke's Essay and in Present Epistemology* (1903); *Pragmatism and Its Critics* (1910).

MOORE, mōōr *or* mōr, ALBERT JOSEPH (1841–93). An English decorative and figure painter, born in York, of a family of painters. (Henry Moore, 1831–95, was his brother.) He studied for a short time at the Royal Academy Schools and began his career with a number of purely decorative works done principally for theatres and churches. He was at first inclined to follow the Pre-Raphaelites, but soon developed an original style, classic in character, though his subjects, which are usually figures of women, are not drawn from antiquity. His sentiment is purely æsthetic, never emotional or dramatic, his sense of beauty is unerring, his color harmonious and delicately brilliant, and his composition simple and decorative, with a quality that is Japanese. His best-known paintings include "Midsummer" (1887); "Blossoms" (Tate Gallery, 1881); "A Summer Night" (Liverpool Gallery); "The Open Book" and "Somnus," both in the Victoria and Albert Museum; "Dreamers" (Birmingham Gallery). For his biography, consult Baldry (London, 1894) and the *Masters in Art,* vol. ix (Boston, 1908).

MOORE, ALFRED (1755–1810). An American jurist, born in Brunswick Co., N. C., a son of Maurice Moore (q.v.). He was educated in Boston. In August, 1775, he was made captain in the First Regiment, North Carolina Line, of which his uncle, James Moore, was colonel, and took part in the defense of Charleston, S. C., in June, 1776. He resigned in March, 1777, but served in the militia against Cornwallis after the battle of Guilford Court House. In 1792 he was elected Attorney-General by the Assembly, though he knew little or no law. He was elected judge of the Superior Court in 1798, but in December of the next year was appointed by President Adams an associate justice of the Supreme Court of the United States. He resigned in 1805.

MOORE, BENJAMIN (1748–1816). An American Protestant Episcopal bishop. He was born in Newtown, Long Island, N. Y.; graduated at King's College in 1768; prepared for the ministry; and went to England, where he was ordained by the Bishop of London in 1774. Returning to America, he was appointed assistant minister in Trinity Church, New York, in the same year. In 1800 he became rector of Trinity Parish. In 1801 he was consecrated Bishop of New York and at the same time was appointed president and professor of logic and rhetoric in Columbia College. He performed the duties of both these positions till 1811, when paralysis disabled him. Bishop Moore's publications include sermons and a pamphlet in vindication of Episcopal services.

MOORE, CHARLES LEONARD (1854–). An American poet and essayist, born in Philadelphia. He became a lawyer and in 1878–79 served as United States Consul at San Antonio, Brazil. Besides contributing critically to the Chicago *Dial,* he published: *Atlas* (1881); *Poems Antique and Modern* (1883); *Book of Day Dreams* (1883); *Banquet of Palacios* (1889), a comedy; *Odes* (1896); *The Ghost of Rosalys* (1900), a poetical drama; *The Red Branch Crests—a Trilogy* (1904).

MOORE, CLARA JESSUP (1824–99). An American philanthropist and writer, born in Philadelphia. She organized in Philadelphia a hospital relief committee during the Civil War and assisted in the foundation of the Temperance Home for Children. After the death of her husband in 1878 she spent much of her time in London, where she died. She published *Miscellaneous Poems* (1875); a romance called *On Dangerous Ground* (1876); *Sensible Etiquette* (1878); *Ether the True Protoplasm* (1885); *Social Ethics and Social Duties* (1892); and other books. The book on ether was written because she believed that ether could account for the Keely motor (q.v.), to whose projector she gave liberally in order that he might develop his idea.

MOORE, CLARENCE BLOOMFIELD (1852–). An American archæologist, born in Philadelphia. He traveled in nearly every part of Europe, in Asia Minor, and in Egypt; crossed the Andes and went down the Amazon River in 1876; and made a trip around the world in 1878–79. During a period of 20 years he explored Indian mounds in nearly all the Southern States. His writings, for the most part published by the Academy of Natural Sciences in Philadelphia, include *Some Aboriginal Sites in Louisiana and in Arkansas* (1913).

MOORE, CLEMENT CLARKE (1779–1863). An American poet and educator, a son of Bishop Moore of New York. He was born in New York, graduated from Columbia College (1798), and was made professor of biblical learning in the General Theological Seminary in New York

(1821), a post that he held until 1850. The ground on which the seminary now stands was his gift. He compiled a *Hebrew and English Lexicon* (1809), and published a collection of *Poems* (1844), among which is "'Twas the Night before Christmas," or more properly, "A Visit from St. Nicholas," which has long been a favorite with young people. It was written for his children in 1822 and appeared anonymously and without his knowledge in the Troy *Sentinel*, Dec. 23, 1823. Consult Stedman, *An American Anthology* (Boston, 1900).

MOORE, CLIFFORD HERSCHEL (1866–). An American Latin scholar. He was born at Sudbury, Mass., and was educated at Harvard (A.B., 1889) and at Munich (Ph.D., 1897). He taught the classics at the Belmont (Cal.) School in 1889–92 and at Phillips Academy, Andover, Mass., in 1892–94. At the University of Chicago he was instructor (1894–95) and assistant professor (1895–98) of Latin; and at Harvard he served as assistant professor of Greek and Latin (1898–1905) and as professor of Latin after 1905. In 1905–06 he was professor of Latin at the American School of Classical Studies in Rome. He edited Allen's edition of Euripides' *Medea* (1899) and Horace's *Odes and Epodes* (1902); is author of *A First Latin Book* (1903) and *The Elements of Latin* (1906), with J. J. Schlicher; and contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA.

MOORE, DAVID HASTINGS (1838–1915). An American Methodist Episcopal bishop, born at Athens, Ohio. He graduated at Ohio University in 1860; was ordained to the ministry the same year; entered the Civil War as a private and rose to be lieutenant colonel of volunteers in the 125th Ohio Infantry. He was president of Cincinnati Wesleyan College (1875–80); president of Colorado Seminary and chancellor of the University of Denver (1880–89); and editor of the *Western Christian Advocate* from 1889 to 1900, when he was elected Bishop and sent to take charge for four years of the Methodist missions in China, Japan, and Korea. From 1904 to 1908 his official residence was Portland, Oreg.; from 1908 to 1912 Cincinnati. In 1912 he retired. He was a member of the General Conferences of 1888, 1892, 1896, and 1900, and of the North China Branch of the Royal Asiatic Society.

MOORE, EDWARD (1712–57). An English dramatist, born at Abingdon, Berkshire. He was a linen draper in early life, but failed in business and devoted himself to literature, *Fables for the Female Sex* (1744) being his first publication. He afterward wrote two unsuccessful comedies, *The Foundling* (1748) and *Gil Blas* (1751). These were followed by *The Gamester* (1753), the good fortune of which may have been due to Garrick's acting and his collaboration. In 1753 he became editor of the *World*, a satirical weekly, with a very talented staff, including Lord Lyttelton, Horace Walpole, and Lord Chesterfield. His *Poems, Fables, and Plays* were collected and published in 1756. The *Fables* were often reprinted with those of John Gay, and were translated into German.

MOORE, EDWARD (1838–1916). An English scholar, born at Cardiff. He was educated at Bromsgrove Grammar School and at Pembroke College, Oxford. For a time he was rector of Gatcombe, Isle of Wight. From 1862 to 1864 he was fellow and tutor of Queen's College, Oxford. In 1864 he became principal of St. Edmund Hall, and in 1903 he was made canon of Canterbury Cathedral. He became honorary fellow of Pembroke and Queen's colleges, and received the Dublin D.Litt. His publications comprise: *Aristotle's Ethics*, books i–iv (5th ed., 1896); *Aristotle's Poetics, with Notes* (1875); *Time References in the Divina Commedia* (1887), translated and published at Florence in 1900 with the title *Gli accenni al tempo nella Divina Commedia; Textual Criticism of the Divina Commedia* (1889); *Dante and his Early Biographers* (1890); *Tutte le opere di Dante Alighieri*, the "Oxford Dante" (1894); *Studies in Dante* (first series, 1896; second series, 1899; third series, 1903). The "Oxford Dante," by all means the best edition of Dante's works, together with Moore's other studies in the same field, placed him among the first of Dante scholars.

MOORE, EDWARD CALDWELL (1857–). An American theologian, brother of George Foot and Frank Gardner Moore. He was born at West Chester, Pa.; graduated from Marietta College in 1877 and from Union Theological Seminary in 1884; and studied at Berlin, Göttingen, and Giessen in 1884–86, and at Brown (Ph.D., 1891). Ordained to the Presbyterian ministry in 1884, he was pastor at Yonkers, N. Y. (1886–89), and of the Central Congregational Church of Providence, R. I. (1889–1901). In the latter year he became Parkman professor of theology at Harvard, where he was university preacher in 1905–06. He lectured also at Mansfield College, Oxford, in 1894 and 1913, at Andover Theological Seminary in 1900, at Lowell Institute, Boston, in 1903, and at Yale Divinity School in 1906. In 1914 he was elected president of the American Board of Commissioners for Foreign Missions. His publications include *The New Testament in the Christian Church* (1904) and *An Outline of the History of Christian Thought since Kant* (1912).

MOORE, EDWARD MOTT (1814–1902). An American surgeon, born at Rahway, N. J. He received his medical education in New York City and Philadelphia (M.D., University of Pennsylvania, 1838). His family had settled in Rochester, N. Y., and it was there that he made his permanent residence, although at different periods, with the title of professor of surgery, giving series of lectures at medical colleges—at Woodstock, Vt. (1842–54), at Berkshire, Mass. (1855), at Starling Medical College, Columbus, Ohio (1857), and at Buffalo Medical College (1858–83). He was president of the New York State Medical Society (1874), of which society he was one of the founders, of the American Surgical Association (1883), and of the American Medical Association (1890). For many years he was president of the board of trustees of the University of Rochester, and he is remembered as the "father" of the Rochester park system.

MOORE, ELIAKIM HASTINGS (1862–). An American mathematician, born at Marietta, Ohio. He studied at Yale (A.B., 1883; Ph.D., 1885) and at Berlin (1885–86); was instructor in mathematics at Yale (1887–89) and professor at Northwestern University (1889–92) and then at Chicago, where in 1896 he was made head of the department. He became a member of the National Academy of Sciences in 1901. The author of many important papers in advanced mathematics, among them "Introduction to a Form of General Analysis," published in

the *New Haven Mathematical Colloquium* (1910), Moore also edited the *Transactions of the American Mathematical Society* (1899–1907), and he was president of the society in 1901–03.

MOORE, Eva (1870–). An English actress, born in Brighton. She went on the stage in 1887, joined Toole's company in 1888, and married in 1891 Henry V. Esmond (q.v.), with whom she managed his play *Eliza Comes to Stay* in 1913. She had played Lady Ernestone in Esmond's *My Lady Virtue* (1903) and Wilhelmina Marr in his *Billy's Little Love Affair* (1903); and was Mabel Vaughan in *The Wilderness* (1901) and Kathie in *Old Heidelberg* (1902 and 1909) with George Alexander. In 1907 she took the name part in *Sweet Kitty Bellairs* (1907); and she played Mrs. Errol in *Little Lord Fauntleroy* and Mrs. Crowley in *The Explorer* in 1908, and the Hon. Mrs. Bayle in *Best People* and the Hon. Mrs. Rivers in *The House Opposite* in 1909.

MOORE, Frank (1828–1904). An American journalist and compiler, a brother of George Henry Moore. He was born in Concord, N. H., but removed to New York City and became a journalist and general writer. In 1869-72 he was Assistant Secretary of Legation in Paris. He edited *Songs and Ballads of the American Revolution* (1856); *Cyclopedia of American Eloquence* (1857); *Diary of the American Revolution* (2 vols., 1860); *The Rebellion Record* (12 vols., 1861–68), a collection of original material bearing on the Civil War; *Lyrics of Loyalty* (1864); *Confederate Rhymes and Rhapsodies* (1864); *Personal and Political Ballads* (1864); *Speeches of Andrew Johnson* (1865); *Life and Speeches of John Bright* (1865); *Women of the War 1861–66* (1866); *Songs and Ballads of the Southern People, 1861–65* (1887).

MOORE, Frank Frankfort (1855–). A British novelist and dramatist, born at Limerick, Ireland, and educated at the Royal Academical Institution, Belfast. His plays include: *A March Hare* (1877); *The Queen's Room* (1891); *Kitty Clive, Actress* (1895). Some of his numerous novels are: *Coral and Coconut* (1890); *The Two Clippers* (1893); *The Secret of the Court* (1895); *The Millionaires* (1898); *A Damsel or Two* (1902); *He Loved but One* (1905); *An Amateur Adventuress* (1908); *The Keeper of the Robes* (1912); *Discovering "Evelina"* (1913). His novels are generally of a sensational kind, and frequently draw upon the author's travels in two hemispheres for characters and incidents. Moore is also author of *Oliver Goldsmith* (1910) and *The Commonsense Collector: A Book of Hints on the Collecting and Housing of Antique Furniture* (1911). In 1915 he published *The Lady of the Reef.*

MOORE, Frank Gardner (1865–). An American Latin scholar, brother of Edward Caldwell and George Foot Moore. He was born at West Chester, Pa., and educated at Yale (A.B., 1886; Ph.D., 1890) and at Berlin (1890–91). He was a Latin tutor at Yale in 1888–93, assistant professor of Latin (1893–1900) and associate professor of Latin and Roman archæology (1900–08) at Dartmouth College, and professor of Latin at Trinity College, Hartford, Conn. (1908–10). In the latter year he became professor of classical philology at Columbia University. He edited the *Transactions* and the *Proceedings* of the American Philological Association, of which he became secretary in 1904. He edited also Cicero's Cato Maior (1904) and Tacitus' *Histories* (1910).

MOORE, George (1853–). An Irish novelist, the son of George Henry Moore, M.P., of Moore Hall, Ballyglass, County Mayo, Ireland. He was educated at a Catholic school in Ireland and under a tutor in London, where, at his father's wish, he prepared to enter the army. Later, in London and in Paris, he studied art. After abandoning this prospective profession he continued his Bohemian life in Paris, becoming intimate in good literary and artistic circles. In the late 1870's he returned to London and, temporarily in straitened circumstances, worked hard as a journalist, critic, and novelist, acquiring by degrees idiomatic fluency in the writing of English, which for years had been an unused tongue to him. In 1901 an interest in the movement known as the Irish literary revival (see Irish Literature, II), in which his friends Edward Martyn (q.v.) and William Butler Yeats (q.v.) bore a prominent part, took him to Dublin, where he remained for a decade, assisting in the establishment of a theatre (a feature of the revival) and identifying himself variously with its literary activities. The interference of Catholic Irish objections with the free play of ideas in art, and also, perhaps, a general failure to fit in with the aims, moods, and methods of the movement, led him to abandon his native land again in 1911, and to present the world with a record of his decade's adventures in a book of most indiscreet confessions, *Hail and Farewell* (3 vols., *Ave, Salve,* and *Vale,* New York, 1911–13). Primarily a novelist, Moore was also a critic of art and a dramatist. Following two small volumes of verse, *Flowers of Passion* (1877) and *Pagan Poems* (1881), came his first novel, *A Modern Lover* (1883), which showed him a disciple—with a difference, however—of Flaubert and Zola, and a realist in his strict regard for major and minor truth, but a realist whose work is often aglow with imaginative insight and poetic quality. Other novels followed close upon his first, but it was not until *Esther Waters* (1894) appeared that Moore's eminence among the novelists of his generation was recognized. This book, together with *A Mummer's Wife* (1884), *Evelyn Innes* (1898), and its sequel *Sister Theresa* (1901), gives Moore his claim to remembrance as a writer of fiction. *The Untilled Field* (1903), a book of stories of anti-Catholic tendency, and *The Lake* (1905), a novel, are Irish in theme and setting, and grew out of his 10 years of later residence in Ireland. In art criticism Moore's stimulating quality is found in his *Impressions and Opinions* (1890) and in *Modern Painting* (1893). In the drama his work is competent and effective, if not masterly and impressive. His plays include *The Strike at Arlingford* (1893); *The Bending of the Bough* (1900); *Diarmid and Grania,* with W. B. Yeats (unpublished, but played 1901). Other works are: *A Drama in Muslin* (1886); *Parnell and his Ireland* (1887); *Confessions of a Young Man* (1888); *Mike Fletcher* (1889); *The Celibates* (1895); *Memoirs of my Dead Self* (1906); *Hail and Farewell* (see above). Besides the last-named book, the *Confessions* and *Memoirs* also are largely autobiographical. Consult also: William Archer, *Real Conversations* (London, 1904); G. K. Chesterton, *Heretics* (New York, 1905); J. G. Huneker, *The Pathos of Distance* (ib., 1913).

MOORE, George Foot (1851–). An American Orientalist, brother of Edward Caldwell and Frank Gardner Moore. He was born at West Chester, Pa. He graduated at Yale in 1872 and at Union Theological Seminary in 1877, entered the Presbyterian ministry, and was pastor of the Putnam Presbyterian Church at Zanesville, Ohio, for five years. From 1883 to 1902 he was Hitchcock professor of Hebrew and the history of religions at Andover Theological Seminary, and at Harvard University he was professor of theology (1902–04), and thereafter Frothingham professor of the history of religion. He was for several years editor of the *Journal* of the American Oriental Society, whose president he was in 1911–12. His publications include: *A Critical and Exegetical Commentary on the Book of Judges* (1895); *The Book of Judges: A New English Translation* (1898); *The Book of Judges: Critical Edition of the Hebrew Text* (Leipzig, 1900); *The Literature of the Old Testament* (1913); *History of Religions* (vol. i, 1913); *Metempsychosis,* the Ingersoll lecture at Harvard (1914).

MOORE, George Henry (1823–92). An American historical writer and librarian, born in Concord, N. H. He removed in 1839 to New York City and in 1843 graduated at New York University. Before leaving college he had become connected with the New York Historical Society, as an assistant to his father, Jacob Bailey Moore, the librarian, and in 1849 succeeded him as its librarian. In this position he remained until 1872, when, on the opening of the Lenox Library (now a part of the New York Public Library), he became its first superintendent. Here he remained until his death. He was a frequent contributor to historical magazines and to the proceedings of historical societies. Among his best-known works are: *The Treason of Charles Lee* (1858); *The Employment of Negroes in the Revolutionary Army* (1862); *Notes on the History of Slavery in Massachusetts* (1866); *A History of the Jurisprudence of New York* (1872).

MOORE, George Thomas (1871–). An American botanist, born at Indianapolis, Ind., and educated at Wabash College (B.S., 1894) and at Harvard (A.B., 1895; Ph.D., 1900). He was plant physiologist and algologist of the Bureau of Plant Industry at Washington (1901–03), had charge of the Laboratory of Plant Physiology of the Department of Agriculture (1903–05), and was in charge of botany at the Marine Biological Laboratory at Woods Hole, Mass. He served as professor of applied botany and plant physiology at the Shaw School of Botany, Washington University, in 1909–12, and during the same period was physiologist to the Missouri Botanical Garden, of which he became director in 1912. He discovered a method of preventing the pollution of water supplies by algæ and made experiments in introducing atmospheric nitrogen by means of bacteria into the soil for crop purposes. He is author of various contributions to scientific journals and of governmental bulletins.

MOORE, Harry Humphrey (1844–). An American genre and portrait painter, born in New York City. He studied under Waugh in Philadelphia and at the Ecole des Beaux-Arts, Paris, under Gérôme. Afterward he became the pupil and friend of Fortuny in Madrid, and still later traveled and painted in Germany, Italy, and Japan. Although both deaf and dumb, he achieved success in his profession at Paris, his permanent residence. His best works include refined, sparkling Japanese studies and Spanish and Moorish scenes, such as "Gypsy Encampment, Granada," and "A Moorish Bazar." He received the Order of Charles III of Spain.

MOORE, Sir Henry (1713–69). An English Colonial Governor, born in Vere, Jamaica. He became Lieutenant Governor of his native island in 1755 and, except for a few weeks in 1759, directed the administration of Jamaica until 1762. In reward for his services in suppressing the slave insurrection of 1760 he was made Baronet. In July, 1765, he was appointed Governor of New York, where he arrived at the beginning of the trouble over the Stamp Act. Influenced by public opinion, he suspended the execution of the act. His administration was generally popular with the people on account of the moderation with which he carried out the orders of the home government during the years following the Stamp Act. He continued to hold the office of Governor until his death.

MOORE, Henry (1751–1844). A Wesleyan minister and biographer of John Wesley. He was born in a suburb of Dublin and was apprenticed to a wood carver. Impressed by the preaching of John Wesley, he frequented the Methodist meetings and joined a class in Dublin in 1777. He served from 1784 until 1786 as assistant traveling companion and amanuensis to John Wesley, and again from 1788 to 1790. Wesley made him one of his three literary executors and appointed him to be, after his death, one of the 12 ministers to regulate the services of City Road Chapel. He was president of the Wesleyan Conference in 1804 and 1823. Moore refused ordination in the Church of England, although he accepted it from Wesley assisted by two Episcopal clergymen; opposed Coke's Lichfield scheme of 1794 for the creation of a Methodist hierarchy and also the proposal brought forward in 1834 for the establishment of a theological school; and on the formation of a centenary fund in 1839 objected to the acquisition of land by the Methodist body. In conjunction with the Rev. Thomas Coke, and under the authority of the conference, he published a *Life of the Rev. John Wesley* in 1792, which, however, owing to a difference with the third literary executor, they had been obliged to prepare without access to Wesley's papers. Most of the papers were afterward obtained, and a new *Life* was published in 1824–25. Moore's other works are: *A Reply to Considerations on the Separation of the Methodists from the Established Church* (1794); *Poems, Lyrical and Miscellaneous* (1806); *Life and Death of Mrs. Ann Moore* (1813); *Thoughts on the Eternal Sonship* (1816); *The Life of Mrs. Mary Fletcher of Madeley* (2 vols., 1817; 9th ed., 1838); *A Short Account of Miss Mary Titherington of Liverpool* (1819); *Sermons* (1830), with autobiography to 1791. His life was published by Mrs. Richard Smith, with the autobiography in 1844.

MOORE, Henry (1831–95). An English marine and landscape painter, a brother of Albert Joseph Moore, born in York. He was the pupil of his father, William Moore, and studied also at the York School of Design and the Royal Academy Schools. At first an excellent animal and landscape painter, he gave himself after

1857 almost entirely to marine subjects. In rendering of wave movement, in veracity of color and texture, and in subtle atmospheric effects he has few rivals. His works include: "The Newhaven Packet" (Birmingham Gallery), "Cat's-paws off the Land" (Tate Gallery, London), "Mount's Bay" (1886, Manchester Gallery), and "Clear Shining after Rain," which won the Grand Prix at Paris in 1889. Moore was elected an academician in 1893.

MOORE, JACOB BAILEY (1797–1853). An American journalist and historical writer, born at Andover, N. H. He learned the printer's trade at Concord, engaged in editorial work and edited the *New Hampshire Journal* from 1826 to 1829, when he was elected sheriff of Merrimack County, N. H. He was a member of the Legislature in 1828. In 1839 he removed to New York and edited the *Daily Whig*. He was in the government employ in Washington, 1841–45, but returned to New York and served as librarian of the Historical Society from 1845 to 1849. From 1849 to 1853 he was postmaster of San Francisco. He published, with John Farmer: *Collections Historical and Miscellaneous* (3 vols., 1822–24), relating principally to the early history of New Hampshire; *Gazetteer of the State of New Hampshire* (1823); *Annals of the Town of Concord* (1824); *Lives of the Governors of New Plymouth and Massachusetts Bay* (1846).

MOORE, JAMES (c.1640–1729). An American Colonial soldier and official. He was said to be a son of Roger Moore, the Irish rebel, and came to South Carolina about 1665. He settled on Goose Creek (Otranto), near the Cooper River, about 15 miles north of Charleston, and soon became prominent in resisting the demands of the Lords Proprietors. He was a member of the Governor's Council in 1682 and of the Assembly in 1692 and in the latter year was excluded from pardon by name by the Proprietors. In 1695 he was a member of Governor Archdale's Council and traded extensively with the Indians. He was elected Governor by the Council in 1700 and served until the arrival of Sir Nathaniel Johnson in 1703.

MOORE, JAMES (1667–1740). An American soldier and Colonial official, born in Charleston, S. C. He saw service in various Indian expeditions, under his father, James Moore, Governor of South Carolina in 1700–03. In 1702 he fought against the Spaniards in Florida, but the expedition he commanded was not successful and left the State in debt. He conducted a victorious campaign against the Appalachian Indians in 1703, and in 1713 commanded the forces sent by Governor Craven to aid the Colony of North Carolina in its desperate struggle with the Tuscarora Indians. When the Convention threw off the proprietary government and deposed Gov. Robert Johnson in 1719, Moore was made Governor, but was succeeded by Arthur Middleton the same year. He afterward became Attorney-General of the State and an admiralty judge. He was Speaker of the Assembly in 1721–25. Ten years later he went with a pioneer colony to North Carolina and settled near Cape Fear, where he died.

MOORE, JAMES HOBART (1852–1916). An American lawyer and industrial promoter, born at Berkshire, N. Y. He was a bank clerk at Binghamton, N. Y., from 1871 to 1873, when he moved to Chicago. There he was admitted to the bar in 1881. He was associated with his brother, William Henry Moore (q.v.), in the promotion of various great industrial corporations, and was also a director of the Rock Island lines and of the American Can Company.

MOORE, JOHN (1729–1802). A Scottish physician and author, born at Stirling. He studied at the University of Glasgow, was apprenticed to a surgeon, became in 1747 surgeon's mate in the army, and served in military hospitals in the Netherlands during the War of the Austrian Succession. After further study and two years of practice at Glasgow he traveled extensively on the Continent. In 1792 he was in France during the disturbances of August and September, and in 1793–94 published his two-volume *Journal* of his residence, frequently quoted in Carlyle's *French Revolution*. His works of travel, *A View of Society and Manners in France, Switzerland, and Germany* (1779) and *A View of Society and Manners in Italy* (1781), are merely interesting in style. He wrote also a volume of *Medical Sketches* (1786), containing some results of first-hand investigation, and three dull works of fiction, *Zeluco* (1786), *Edward* (1796), and *Mordaunt* (1800), to the first of which Byron referred in the addition to the preface of *Childe Harold*. He edited (1797) the works of his friend and patient, Smollett, and wrote the memoir that introduced the edition. Prevost and Blagdon edited *Mooriana, or Selections from the Moral, Philosophical, and Miscellaneous Works of Dr. John Moore* (London, 1803). Consult the *Life* by Anderson (Edinburgh, 1820).

MOORE, SIR JOHN (1761–1809). A British general. The eldest son of Dr. John Moore (q.v.), he was born at Glasgow, Nov. 13, 1761. He entered the army when only 15 and served with distinction in Nova Scotia, Corsica, the West Indies, Ireland, and Holland. He was in Egypt with the army under Abercromby, and obtained the Order of the Bath for his services during the operations around Abukir Bay. In 1802 Moore served in Sicily and Sweden. In 1808 he was sent with a corps of 10,000 men to strengthen the English army in the Peninsula. In October he moved his army from Lisbon, with the intention of advancing by Valladolid to unite with the Spanish general Romana and threaten the communications between Madrid and France. But the apathy of the Spaniards and the successes of the French in various parts of the Peninsula soon placed him in a critical position. He had determined to make a bold advance from Salamanca to attack Soult, when the news reached him that Madrid had fallen and that Napoleon was marching to crush him at the head of 70,000 men. Moore's forces amounted to only 25,000 men and he was consequently forced to retreat. In December he began the march from Astorga to Coruña, a route of nearly 250 miles, through a desolate and mountainous country, made almost impassable by snow and rain, and harassed by the enemy. The soldiers suffered intolerable hardships, and arrived at Coruña in a very distressed state; but it was impossible to embark without fighting. On Jan. 16, 1809, the French under Soult attacked and a desperate battle ensued. Moore was struck by a cannon ball on the left shoulder and died in the moment of victory. The French were repulsed with the loss of 2000 men. Consult: J. C. Moore, *Life of Sir John Moore* (London, 1834); W. F. P. Napier, *History of the Peninsular War* (5 vols., New York, 1856);

C. B. Mayne, "Moore," in Spenser Wilkinson, *From Cromwell to Wellington* (London, 1899); *Diary*, edited by Sir J. F. Maurice (2 vols., London, 1904).

MOORE, JOHN (1826–1907). An American physician, a surgeon-general of the United States army. He was born in Indiana, entered the United States army as assistant surgeon in 1853, and served in Florida and on the Utah expedition (1857). When the Civil War broke out he was attached to the Cincinnati Marine Hospital, was promoted surgeon in 1862, and was assigned to the Army of the Potomac. In 1863 he became medical director of the Army of the Tennessee and accompanied General Sherman on his march to the sea and through the Carolinas. In 1865 he received the brevet of colonel, in 1883 he was made assistant medical purveyor with the rank of colonel, and in 1886 he was appointed surgeon-general of the army with the rank of brigadier general. He was retired for age in 1900.

MOORE, JOHN BASSETT (1860–). An American publicist, an authority on international law. He was born Dec. 3, 1860, at Smyrna, Del., graduated at the University of Virginia in 1880, studied law at Wilmington, and at 23 was admitted to the Delaware bar. Entering the Department of State as a law clerk in 1885, the next year he was appointed Third Assistant Secretary of State. During his service in this position he acted as secretary to the Conference on Samoan Affairs (1887) and to the Fisheries Conference (1887–88). After 1891 he held the chair of international law and diplomacy at Columbia, but was frequently granted leave of absence to accept appointments in the public interest. For part of 1898 he served as Assistant Secretary and Acting Secretary of State, and after the close of the war with Spain was secretary and counsel to the American Peace Commission at Paris. Subsequently Moore represented the government as agent before the United States and Dominican Arbitration Tribunal (1904), as delegate to the Fourth International American Conference at Buenos Aires and special plenipotentiary to the Chilean centenary (both 1910), and as delegate to the International Commission of Jurists at Rio de Janeiro (1912). In 1913 he accepted the post of counselor to the State Department (with power to act as Secretary of State), but the next year he resigned and resumed his duties at Columbia. A member of the Permanent Court at The Hague (from 1913), member of the Institut de Droit International and of the Institut Colonial International, president of the American Political Science Association (1914), and chairman of the Lake Mohonk Peace Conference (1914 and 1915), Moore was further honored by the degree of LL.D. from Columbian (now George Washington) University, Delaware College, Yale, the University of Chile, and Brown. His works, of the highest importance in their field, include: *Reports on Extraterritorial Crime* (1887); *Extradition and Interstate Rendition* (2 vols., 1891); *American Notes on the Conflict of Laws* (1896); *History and Digest of International Arbitrations* (6 vols., 1898); *American Diplomacy: Its Spirit and Achievements* (1905); *Digest of International Law* (8 vols., 1906); *Four Phases of American Development: Federalism, Democracy, Imperialism, Expansion* (1912). He also edited *The Works of James Buchanan* (12 vols., 1908) and became an editor of the *Political Science Quarterly* and of the *Journal du Droit International Privée*.

MOORE, JOHN PERCY (1869–). An American zoölogist, born at Williamsport, Pa. He was educated at the Central High School of Philadelphia (A.B., 1886) and at the University of Pennsylvania (B.S., 1892; Ph.D., 1896), where he was instructor in zoölogy from 1892 to 1907, assistant professor in 1907–09, and thereafter professor. In 1902 he became assistant curator of the Academy of Natural Sciences at Philadelphia. After 1890 he was repeatedly employed by the United States Fish Commission, served as instructor in biology at the Hahnemann Medical College in 1896–98, and was instructor in zoölogy at the Marine Biological Laboratory at Woods Hole, Mass., after 1901.

MOORE, JOHN WHITE (1832–1913). An American naval officer, born at Plattsburg, N. Y. He was appointed third assistant engineer in the United States navy in 1853 and was promoted to chief engineer in 1861. During the Civil War he took part in the engagements with the ram *Manassas* and in the capture of the defenses of Pensacola in 1861; in the passage and capture of Forts Jackson and St. Philip, the capture of New Orleans, the passage of the Vicksburg batteries, and the fight with the ram *Arkansas* in 1862; and in the capture of Port Hudson in 1863. He originated the use of chain cables to protect the sides of wooden ships, of a paint designed to render fighting ships less easily visible, and of the fighting tops until lately found on the masts of all large war vessels. He retired in 1894 with the rank of commodore, but during the Spanish-American War he served as an inspector in the New York Navy Yard. For his services in the Civil War he was raised to the rank of rear admiral in 1906.

MOORE, MAURICE (1735–77). An American Colonial legislator and jurist, born in Brunswick Co., N. C. He became a member of the State Assembly in 1757. From 1767 to 1773 he was one of the three judges of the Superior Court. He served as colonel of brigade in the expedition of Governor William Tryon (q.v.) against the Regulators (q.v.) in 1771. In this year he published the venomous attack on Governor Tryon signed "Atticus." He was a member of the Provincial Congresses of 1775 and 1776 and of the Constitutional Convention of 1776.

MOORE, NICHOLAS (?–1689). A chief justice of Pennsylvania, born in England. He was chairman of the first Provincial Assembly in 1682, Speaker of the Assembly in 1684, and in the same year was appointed Chief Justice. In 1685 he was impeached by the Assembly for exceeding his powers, but he was never tried by the Council. His case is peculiarly interesting as being probably the first instance of impeachment that occurred in America. Consult: W. R. Shepherd, *History of Proprietary Government in Pennsylvania* (New York, 1896, and as vol. vi of *Columbia University Studies in History, Economics, and Public Law*).

MOORE, ROBERT (1838–). An American civil engineer, born at New Castle, Pa. He graduated from Miami University in 1858 and after 1863 was engaged in civil engineering, chiefly in the location and construction of railroads. In 1877–81 he was sewer commissioner and a member of the board of public works of St. Louis, Mo., where from 1897 to 1913 he was a member of the board of education. He

was president of this board in 1905–06 and 1909–10. He became a consulting engineer and a member of the Brazos River and the Southwest Pass boards of engineers. He served as president of the American Society of Civil Engineers in 1902.

MOORE, THOMAS (1779–1852). An Irish poet, born in Dublin, May 28, 1779. In 1794 he went to Trinity College, Dublin, which had been opened to Roman Catholics in 1793. He had already shown a remarkably quick mind, a gift for music, and had written in 1793 "Lines to Zelia" and "A Pastoral Ballad." These verses appeared in the *Anthologia Hibernica*, a periodical which lived only two years. Noteworthy in his university experience was his friendship with Robert Emmet, which nearly involved him in the United Irish conspiracy. He went to London in 1799 and soon arranged for the publication by subscription of his *Anacreon* (1800). He had the good luck to find a patron in the Prince of Wales, who accepted the dedication of the poem. The *Anacreon* was followed by *Poems by the Late Thomas Little* (1801), a volume of sweet but oversensuous verse, much blamed, much applauded, and widely read. Moore's musical talents soon made him a welcome guest among the aristocracy. In 1803 he was appointed admiralty registrar at Bermuda, but, disliking the post, he intrusted it to a deputy (1804) and traveled through the United States and Canada, visiting, among other cities, New York, Washington, Baltimore, Philadelphia, and Boston. He returned to England in November, 1804. In 1806 appeared *Odes* and *Epistles*, which Jeffrey made the occasion for a savage attack on Moore's earlier erotics (*Edinburgh Review*, July, 1806). The incident led to a duel interrupted by the police (Aug. 11, 1806). After this fiasco the combatants became cordial friends. In 1807 Moore published his *Irish Melodies*, 124 in number, in 10 parts. His three satires, *Corruption* and *Intolerance* (1808) and the *Skeptic* (1809), fell flat, as they deserved to do. On the other hand, lampoons on the Regent and his favorites went from mouth to mouth and were still liked when they were gathered in *The Two-penny Post Bag* in 1813. In 1811 Moore married a young actress, Miss Bessie Dyke, with whom he seems to have lived happily. In 1815, with the aid of a library of books on Oriental themes, Moore set to work on *Lalla Rookh*, a sugared Oriental romance in verse, with which he made an immediate and striking success on its publication in 1817. About this time he became embarrassed by the defalcation of the deputy left at Bermuda and was compelled to retire for a time to the Continent. At Venice he visited Lord Byron, from whom he received the famous *Memoirs*, afterward reluctantly burned. Moore returned to England in 1822. In 1835 he was granted a literary pension of £300, which was supplemented in 1850 by a civil pension of £100.

Moore's popularity as a poet in his day well-nigh rivaled that of Byron or Scott. His fame now rests mostly upon a few of the best poems of the *Irish Melodies* (10 parts, 1807–34) and *National Airs* (1815). Since the Elizabethan age the lyric had been dissociating itself from music. Moore again united them, and so completely that it is unfair to estimate his lyrics independently. They are light, airy, and graceful, though without the passion of Byron or Shelley. Among Moore's other works are: *The Fudge Family in Paris* (1818), humorous verses; *The Loves of the Angels* (1823); *The Memoirs of Captain Rock* (1824), an attack on the Irish church; a prose romance entitled *The Epicurean* (1827); lives of Sheridan (1825), Byron (1830), Edward Fitzgerald (1831); and a *History of Ireland* (completed in 1846). The *Life of Byron*, the main source for all later biographies, is still a classic. Consult: Lord John Russell (ed.), *Memoirs, Journals, and Correspondence of Moore* (8 vols., London, 1853–56); Kent, *Poetical Works*, with memoir (ib., 1883); Gunning, *Thomas Moore, Poet and Patriot* (ib., 1900); S. L. Gwynn, *Thomas Moore* (New York, 1905); J. C. L. Clark, *Tom Moore in Bermuda* (2d ed., Boston, 1909).

MOORE, WILLIAM HENRY (1848–). An American lawyer and capitalist. He was born at Utica, N. Y., studied at Amherst College, and was admitted to the Wisconsin bar in 1872. Settling in Chicago, he made a specialty of promoting corporations and with his brother James H. Moore (q.v.) he formed in 1898–99 four great corporations, the American Can Company, the American Tin Plate Company, the American Steel Hoop Company, and the American Sheet Steel Company, known together as the "Moore group." They had a combined capital of $187,000,000; eventually they were absorbed by the United States Steel Corporation. Judge Moore promoted also the Diamond Match Company and the National Biscuit Company in 1898. He became a director of the United States Steel Corporation, the Rock Island lines, and other important corporations. "Judge" Moore, as he was called, was a familiar figure at American and English horse shows, where his coaching turnouts carried off various prizes.

MOORE, WILLIS LUTHER (1856–). An American meteorologist, born at Scranton, Pa. He was at first a reporter for the Binghamton (N. Y.) *Republican* and then was on the staff of the Burlington (Iowa) *Hawkeye*. Entering the United States Signal Corps, he rose rapidly, becoming professor of meteorology in 1894. From 1895 to 1913 he was chief of the United States Weather Bureau. He served as president of the National Geographic Society from 1905 to 1910 and materially aided in its development. His writings include a *Meteorological Almanac and Weather Guide* (1901) and *Descriptive Meteorology* (1910).

MOOREA, mō′ō-rā′ä, or **EIMEO,** ī′mē-ō. One of the Society Islands (q.v.), situated 25 miles west-northwest of Tahiti, in lat. 17° 30′ S. and long. 149° 50′ W. It covers an area of about 50 square miles, has several good harbors, and is very rugged but fertile. The chief products are coconuts, bananas, sugar cane, oranges, and vanilla beans; also copra and pearls. It contains a missionary station, and most of the inhabitants are Protestants.

MOOREHEAD, WARREN KING (1866–). An American archæologist and anthropologist, born in Siena, Italy. He studied at Denison University and the University of Pennsylvania and at the Smithsonian Institution; explored the mounds of the Ohio Valley; and had charge of researches in Colorado, New Mexico, and Utah. He became an assistant in the archæological department of the Columbian Exposition, soon after was appointed curator of the museum of the Ohio State University, and then became curator of the department of archæology at Phillips Academy, Andover, Mass. He wrote: *Fort Ancient* (1890); *Primitive Man in Ohio* (1892);

Prehistoric Implements (1900); *Prehistoric Relics* (1905); *Tonda: A Story of the Sioux* (1904); *Explorations in New Mexico, Arizona, Indiana* (1906); *The Stone Age in North America* (1910).

MOORE PROCESS. See section on *Metallurgy* under GOLD.

MOORE'S CREEK. A small stream in North Carolina, on the banks of which, about 20 miles from Wilmington, a battle of the American Revolution was fought on Feb. 27, 1776, between 1600 Loyalists, mostly Highland Scotch, under Brig. Gen. Donald MacDonald, and about 1000 militia and minutemen, under Gen. James Moore and Cols. Richard Caswell and Alexander Lillington. The Loyalists charged across the girders of a bridge from which the planks had been removed, but within three minutes from the beginning of the engagement the Loyalists were routed. Several of them were killed, MacDonald and about 20 others taken prisoners, while of the patriots only two were wounded. The effect of this battle, says Fiske, "was as contagious as that of Lexington had been in New England."

MOORESVILLE, mōrz'vĭl. A city in Iredell Co., N. C., 28 miles north of Charlotte, on the Southern Railroad (Map: North Carolina, B 2). It has cotton-goods factories, flour mills, lumber yards, creameries, saw mills, and manufactories of furniture, mattresses, shingles, etc. The surrounding region is well adapted to dairying and farming. Mooresville owns its water works, sewage system, and electric-light plant. Pop., 1900, 1533; 1910, 3400.

MOOR'FIELDS. A tract of marshy ground outside the old wall of London, north of the Tower. It was later called Fensbury or Finsbury, the present name of the district.

MOOR FOWL. See GROUSE.

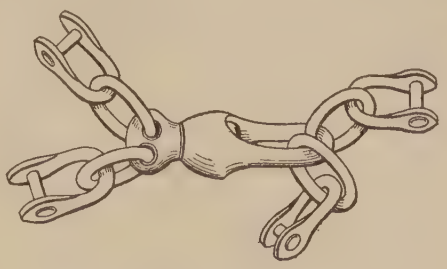
MOORGATE, mo͝or'gāt *or* mōr'gāt. The later name of a gate in the wall of Roman London leading to Moorfields. It was removed about the middle of the eighteenth century. Its name is preserved in the present Moorgate Street.

MOOR'HEAD. A city and the county seat of Clay Co., Minn., on the Red River of the North, opposite Fargo, N. D., and at the junction of the Northern Pacific and the Great Northern railroads (Map: Minnesota, A 4). It is the seat of a State normal school and of Concordia College, and contains a public library. Moorhead is an important distributing centre for the tributary agricultural country and has a large trade in wheat and potatoes. It has grain elevators, canning factories, tent and awning plant, concrete block and silo factories, brickyards, railroad yards, a foundry, and machine shops. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 3730; 1910, 4840.

MOOR HEN. The British gallinule. See GALLINULE.

MOOR ILL. See RED WATER.

MOORING SWIVEL. A device employed to join the two chain cables by which a ship is moored so that the swinging of the vessel by the tide or wind will not cause the cables to be crossed or fouled (i.e., twisted about each other). It consists of a large and very heavy link, one end of which has been much thickened. Through this end, in the longitudinal axis of the link, a hole is bored. Through this hole passes the large swivel pin, having a heavy head on the inside to prevent its pulling out and a pair of eyes or holes in the other end, which is flattened for the purpose. Links are fitted in each of these holes, and two others are in the heavy link of the swivel. By means of shackles the four links are connected to the parts of the ship's chains,



MOORING SWIVEL.

the two on the pin to the parts leading from the anchors, the other two to the parts leading into the ship. It is difficult to take off a mooring swivel in bad weather; therefore, if a storm is expected, it is usually removed so that the vessel will be free to work her cables or heave up the anchors. See ANCHOR; HAWSE; MOOR, MOORING.

MOORISH ART. A term applied to the art of the Mohammedans in north Africa, outside of Egypt, and in Spain, though the latter phase of its development is more often called Hispano-Moresque. See MOHAMMEDAN ART.

MOORS (ML. *Morus*, Lat. *Maurus*, Gk. Μοῦρος, perhaps from *μαῦρος, mauros, ἀμαυρός, amauros*, dark, or perhaps from their original native name). The name given to a mixed people constituting a very important element in the population of northern Africa, especially Morocco. Their appearance indicates their origin, which is a mixture of the Mauri, Numidians, Phœnicians, Romans, and Arabs, who have successively held possession of the country. They are a well-formed race, with fine Oriental features and a mild and melancholy expression of countenance. The Moors employ the Arabic language, but with many corruptions and deviations from the original. They were conquered and converted by the Arabs at the beginning of the eighth century after a severe struggle. Having once embraced Mohammedanism, they joined the Arabs in the invasion of Spain, passing over in such numbers that in the early period of Spanish history the terms Moors, Saracens, and Arabs are used synonymously to designate the Mussulmans of the peninsula. In the tenth century Moorish domination supplanted that of the Arabs in northwestern Africa. At the close of the eleventh century the Moorish sect of the Almoravides (q.v.), who had established their sway in Morocco, invaded Spain and swept away the Arab kingdoms which had arisen on the ruins of the Caliphate of Cordova. After half a century their realm fell to pieces, and the Moorish sect of the Almohades (q.v.) became dominant in Morocco and Spain. In the meanwhile the Christian power in Spain had been steadily growing, and in 1212 the power of the Almohades was shattered in the battle of Navas de Tolosa (q.v.). What was left of Moorish dominion in the peninsula was soon consolidated in the Kingdom of Granada, which rose to a height of splendor almost rivaling that of the former Caliphate of Cordova. The kings of Granada carried on a vigorous warfare with the kings of Castile; but at length, weakened by internal discord, they succumbed in 1492 to the arms of Isabella of Castile and Ferdi-

nand of Aragon. The Moors, or at least that portion of them who refused to accept Christianity, were then expelled from Spain and began their piratical career in the Barbary states. Those who accepted the religion of their conquerors came to be known as Moriscos. They were subjected to the most rigorous supervision, and any lapses from their adopted religion were ruthlessly punished by the Inquisition. For more than three-quarters of a century they lived as peaceful subjects of Spain and constituted by far the most industrious and intelligent element in the population. The persecutions of Philip II drove them to revolt (1568–70), but the insurrection was suppressed with great cruelty by Don John of Austria, and a large number were driven from the country. The policy of oppression was continued with increased severity under Philip III, and in 1609 the Moriscos were finally expelled from the country, the loss of more than half a million of her most active citizens proving in the end a disastrous blow to Spain. The Moriscos crossed over to Africa, but were received with hostility by their kin, from whom long absence had estranged them. According to the 1910 census, there were 60,000 Moriscos in Spain.

Consult: Abu ibn Mohammed al Makarri, *The History of the Mohammedan Dynasties in Spain*, translated and annotated by P. de Gayangos (2 vols., London, 1840–43); Dozy (ed.), *Histoire de l'Afrique et de l'Espagne* (Leyden, 1848–51), translated from the Arabic of Ibn Adhari; id., *Recherches sur l'histoire politique et littéraire de l'Espagne pendant le moyen âge* (2 vols., 2d ed., Leyden, 1860); Coppée, *History of the Conquest of Spain by the Arab Moors* (2 vols., Boston, 1881); Lane-Poole, *The Moors in Spain* (London, 1886); Lea, *The Moriscos of Spain* (Philadelphia, 1901); Scott, *History of the Moorish Empire in Europe* (3 vols., ib., 1904); Fitzgerald, *In the Track of the Moors* (New York, 1905); A. G. Soler, "Caballeros españoles en Africa y africanos en España," in the *Revue Hispanique* for 1905 (vol. xii) and 1907 (vol. xvi).

MOORSHEDABAD, mōōr'shĕ-dȧ-bäd'. A town of British India. See MURSHIDABAD.

MOO'RUP (native name). A cassowary (q.v.); often wrongly written mooruk.

MOORWORT. See ANDROMEDA; and Plate of ANEMONE, ETC.

MOOS, mōs, SALOMON (1831–95). A German aurist, born at Randegg, Grand Duchy of Baden. He studied at Heidelberg, Prague, and Vienna, in 1859 became lecturer in aural surgery at the first-named university, and in 1866 was appointed professor there. His researches in the pathology of the labyrinth of the ear were important. He first showed that the derangement of hearing and equilibrium observed in certain infectious diseases is due to the presence of microörganisms in the labyrinth. Among his publications are *Ueber Pilzinvasion des Labyrinths im Gefolge von einfacher Diphtherie* (1887) and *Untersuchungen über Mittelohrerkrankungen bei den verschiedenen Formen der Diphtherie* (1890). From 1868 he edited at Wiesbaden, in collaboration with Knapp, the *Zeitschrift für Ohrenheilkunde*, of which an edition in English was also published.

MOOSE (Algonquian *musu*, Knisteneaux *mous'wah*, wood eater). The popular name for the deer of the genus *Alces*, the largest quadruped of North America. The male, called bull moose, is much larger than the female (cow) and stands 6 feet high or more at the shoulders, while the weight may exceed half a ton. The head is very large and bears antlers of remarkable size and shape. They consist of an imperfectly separated anterior and posterior part, and in the female and in the yearling male are only knobs an inch high. The ungainly aspect of the head is greatly increased by the large nostrils and by the large, hairy muzzle, which is almost long and muscular enough to be a proboscis, and it practically serves that purpose in gathering leaves, lichens, and twigs. The neck is short and stout, but the legs are very long, so that the animal cannot accommodate itself to feeding from the ground and consequently seeks its food on shrubs and trees. The front legs are considerably longer than the rear ones, and this makes its gait, whether slow or fast, extremely awkward. The color of the moose is generally some shade of brown, the legs yellowish, but the pelage varies with age and season and may be strongly grayish. During the summer moose are solitary in their habits, except that the young are usually found with the mother. The breeding season begins in September, and mating goes on through the fall. At this season the bulls lose their natural timidity, become savage, and will readily attack any animal or even man, if their rage is aroused.

During the winter the moose often gather in small herds and form moose yards by trampling down the snow over a limited area, so that the shrubs and young trees become available for food. The young are born in the spring or early summer, one or two at a birth, and remain with the mother until the third year. Moose are among the very finest of game animals and have been so eagerly sought, not only for sport, but for meat, which is highly prized, that their numbers have been greatly reduced in all the settled parts of America. They are hunted in the late summer and early fall, oftentimes by means of jack lights, as are other deer; but later in the season they are generally captured after being called within gunshot, the call being a rude trumpet made of a roll of birch bark, through which the voice of the animal is imitated. In winter moose are often followed on snowshoes. When taken young, moose are easily tamed, and there are many instances recorded of their use as draft animals.

The elk (*Alces malchis*, or *alces*) of the Old World is quite distinct from the moose (*Alces americana*). In the Old World the elk is found throughout the forested portions of northern and central Europe; it is at present confined, in the region west of Russia, to the milder parts of the Scandinavian peninsula and eastern Germany. Recently the moose of the Yukon valley, called the Alaskan moose (*Alces gigas*), has been separated as a distinct species. The differences between these species are, however, very slight, consisting of slight variations in the palmation of the horns, the color of the pelage, and the size. The Alaskan moose is undoubtedly the largest form known. It is found in northwestern British Columbia, Yukon, and Alaska as far north as the Arctic Ocean and westward to the Yukon delta and along the south coast as far as Katmai. The common moose of America is found throughout Canada and southward into Maine, Minnesota, and the northern Rocky Mountains. In 1915 moose were protected throughout the United States ex-

cept in Minnesota, where there was an open season—for bull moose only—from November 10 to 30. In the United States the moose is at present found in five States: Maine, Minnesota, Montana, Wyoming, and Idaho. There are 550 in the Yellowstone Park. In northern Minnesota a national moose preserve of over 900,000 acres has been formed, with an estimated population of 10,000 head. This and the great New Brunswick preserve will save the American moose, and the restricted Kenai peninsula in Alaska will preserve from extinction the giant moose of that region. Consult authorities mentioned under DEER; see HUNTING BIG GAME; Plate of DEER OF NORTH AMERICA.

MOOSE, LOYAL ORDER OF. A secret, beneficiary society, paying sick and funeral benefits; founded to furnish an organization affording the advantages of brotherhood without the necessity of purchasing life insurance or enlisting in any other common cause. It was founded in 1888 by Dr. J. H. Wilson at Louisville, Ky. The first lodge was established at Cincinnati, Ohio. At Mooseheart, near Aurora, Ill., the society owns 1000 acres, on which are extensive buildings comprising a plant variously referred to as a farm, home, and vocational school, with arrangements to care for orphans of members and dependent members of the order. The society is governed by a Supreme Lodge. It has 1610 subordinate lodges and about 615,864 members.

MOOSE BIRD (so called from its frequent companionship with the moose). A local name in eastern Canada for the Canada jay. See JAY.

MOOSE FLY. A biting fly (*Hæmatobia alcis*) closely allied to the horn fly (q.v.). It is a very annoying parasite of the moose in the great cranberry swamps of northern Minnesota and elsewhere. Unlike other external parasites of animals, it does not leave the body of the host as long as it remains unskinned.

MOOSE'HEAD LAKE. An irregular body of water on the border of Somerset and Piscataquis counties, Me. (Map: Maine, C 3). It is the largest lake in New England, being about 35 miles in extreme length and 12 miles in maximum width and having an area of about 115 square miles. It receives the Roach and Moose rivers, and its outlet is the Kennebec River. It lies at an elevation of 1026 feet above sea level, in the midst of a wild and sparsely inhabited forest region where moose and deer are still found. A railroad now runs along the south shore through Greenville, and steamboats have for many years plied on the lake.

MOOSE'JAW. The chief city of the electoral division of Moosejaw, Saskatchewan, Canada, situated on Moosejaw River and on the Canadian Pacific, Grand Trunk Pacific, and Canadian Northern railways (Map: Saskatchewan, E 7), about 400 miles west of Winnipeg. Its buildings and institutions include the city hall, courthouse, land-titles office, public library, two business colleges, and collegiate institute. Among its industrial establishments are lumber yards, bridge and iron works, flour mills, and manufactories of sashes and doors, automobiles and tractors, faced and pressed bricks, tiles and pottery, mattresses, tents, brushes and brooms. The city possesses three parks, an electric street railway, and electric power available for manufacturing. It owns its electric-lighting and water systems, with incinerator plant. It is situated in a fertile wheat-growing district. Pop., 1901, 1558; 1911, 13,823.

MOOSEWOOD. See LEATHERWOOD.

MOOSIC, mōō'sĭk. A borough in Lackawanna Co., Pa., 6 miles south of Scranton, on the Lackawanna River and on the Delaware and Hudson, the Central of New Jersey, the Lackawanna and Wyoming Valley, and the Wilkes-Barre and Eastern railroads (Map: Pennsylvania, K 4). It is in a coal-mining region, and there are manufactories of canvas gloves and silk products. Pop., 1900, 1227; 1910, 3964.

MOO'SOMIN. A town, port of entry, and the judicial centre of the electoral division of Qu'appelle, Saskatchewan, Canada, on the Canadian Pacific Railway (Map: Saskatchewan, J 7). It has a normal school, collegiate institute, a school of music, and general hospital. There is a government creamery. The town, which was incorporated in 1889, is the centre of a rich mixed farming district. It is district headquarters for the Royal Northwest Mounted Police. Pop., 1911, 1143.

MOOT (AS. *mōt*, meeting, assembly; connected with *mētan*, to meet). The name given in Anglo-Saxon England to the meetings of the tribe or district and the like. In these moots was transacted a great part of the public business, whether executive, legislative, or judicial. The best known of these assemblies is the one which was attended by the great men of the whole nation or tribe and was known as the moot of the wise men or Witenagemot (q.v.). But smaller districts, like the shire, the hundred, and the township, also held moots, which were usually attended by all the freemen of the district. The place of meeting of such an assembly was also frequently termed moot. Consult William Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897).

MOPSUESTIA, THEODORE OF. See THEODORE OF MOPSUESTIA.

MOP'SUS (Lat., from Gk. Μόψος). 1. In Greek mythology, a seer, one of the Thessalian Lapithæ, the son of Apollo by Himantis, or of Ampyx by Chloris. He took part in the combat between the Centaurs and Lapithæ, in the Calydonian Hunt, and in the Argonautic Expedition, during which he was killed by a snake in Libya, which sprang from the blood of the Gorgon Medusa. (See GORGO.) After his death he was honored as an oracular hero. 2. A renowned seer, the son of Apollo and Manto, daughter of Tiresias. At Colophon he surpassed Calchas in prophecy. With Amphilochus he was credited with having built the Cilician city Mallos, where both the founders perished in a dispute over its possession.

MOQUEGUA, mō-kā'gwȧ. A coast department of Peru, bounded by the Department of Arequipa on the north, Puno on the east, Tacna (disputed with Chile) on the south, and the Pacific Ocean on the west (Map: Peru, C 7). Its area is 5549 square miles. It is traversed by the main range of the Andes, whose slopes are the most fertile and populous portions of the department. The coast region is a rainless desert. Vineyards cover large parts of the cultivated areas, and wine and brandy are the chief products. The mining of copper, marble, silver, sulphur, borax, and coal is carried on to some extent. Pop. (est.), 31,920. The capital, Moquegua, is situated in the centre of the province, about 68 miles by rail from the port of Ilo. Founded in 1626, it suffered frequently from de-

structive earthquakes and was entirely destroyed by the last upheaval, which occurred in August, 1868. Its population is estimated at 5000.

MOQUELUMNAN, mō′ke-lŭm′nan. See MIWOK STOCK.

MOQUI, or **MOKI,** mō′kē. A tribe of North American Indians. See HOPI.

MOR, mōr, or **MORO VAN DASHORST,** mō′rō vän däs′hôrst, ANTONIS (?1512–c.78). An eminent Dutch portrait painter. He was born at Utrecht and studied under Jan Scorel and in Italy. His rise to eminence was rapid. He secured the patronage of Emperor Charles V and was appointed court painter by Philip II. He visited Italy, Spain, and England and was frequently employed by the Duke of Alva at Brussels. About 1568 he settled in Antwerp, where he died between 1576 and 1578. Mor was the finest portrait painter of his day north of the Alps and, though strongly influenced by Titian, developed a masterly individual style, distinguished by warmth of color and powerful characterization. Among his most celebrated portraits are: "Queen Mary of England" (Prado, Madrid); "Portrait of a Goldsmith" (The Hague Gallery); "Alexander Farnese" (Parma Gallery); "Hubert Goltzius" (Brussels Gallery); "Duke of Alva" (Hispanic Society, New York). He is also well represented in the galleries of Berlin, Vienna, Cassel, Florence, and St. Petersburg, in the Louvre, and in many private collections in England. Consult the monograph by Hymans (Brussels, 1910).

MORA, mō′rä (Guiana name). Certain species of trees of the genus *Mora* of the family Leguminosæ, especially *Mora excelsa.* The timber, which is exported as mora wood, is darker than mahogany. It is valued for shipbuilding and is said to be equal to oak of the finest quality, being one of the eight woods rated as first class. *Mora excelsa* is said to be one of the largest trees in British Guiana, often attaining a height of 150 to 200 feet. In addition to its use in shipbuilding the wood is said to be well adapted for use as railroad ties and paving blocks. It resists dry rot well, but is subject to the attack of marine worms if used under water.

MORA, mō′rä, José (1638–1725). A Spanish sculptor, pupil of the versatile Alonso Cano. Some of his best work is found in the Capilla del Cardenal in the mosque at Cordova and in the Cartuja near Granada. Consult B. Haendeke, *Studien zur Geschichte der spanischen Plastik* (Strassburg, 1900).

MORA, (FRANCIS) LUIS (1874–). An American figure and portrait painter. He was born in Montevideo, Uruguay, and studied at the Boston Museum Art School under Benson and Tarbell and at the Art Students' League, New York, under Mowbray. After some time spent in illustrating magazines he received in 1900 his first important commission, a large decorative panel in the public library, Lynn, Mass. Success came early. Among his numerous prizes are gold medals from the Philadelphia Art Club (1901) and Pennsylvania Fine Arts Society, Philadelphia (1902), first Hallgarten prize, National Academy of Design (1905), Evans prize, Salmagundi Club (1908), and the Shaw prize, National Academy (1910). He was elected a member of the Academy in 1906 and also became a member of the American Water Color Society and the Architectural League. Mora made himself one of the most prominent of the younger American painters of his day. His art, though essentially modern in feeling and treatment, is reminiscent of the old Spanish masters and shows the influence of his independent studies in Spain. A facile brushman and a good draftsman, he excels especially in his treatment of color, which, while rich and glowing, shows refinement and at times much delicacy in tone values. Good examples of his work are: "The Letter"; "The Mendicants" (1906); "Spanish Café" (1906); "Vacation Time" (water color, 1907); "The American Gladiators" (1908); "After the Bull Fight, Granada" (1910); "The Studio Tea" (1911); "Summer Morning" (1912); "The Cruise of the Ellira"; "Evening News" (1914). His figure compositions are perhaps his happiest efforts. He exercised a wide influence as a teacher in the Art Students' League and in the New York School of Art.

MORA′CEÆ (Neo-Lat. nom. pl., from Lat. *morus,* mulberry), or MULBERRY FAMILY. A family of dicotyledonous shrubs and trees comprising about 1000 species, natives of temperate and tropical regions. The largest genus is *Ficus* (fig), which includes nearly 700 species. The representatives of the family in North America are the genera *Morus* (mulberry) and *Maclura* (osage orange). The native mulberry is *Morus rubra* (red mulberry), which occurs in rich soil throughout the eastern United States. *Morus alba* (white mulberry) was introduced from the Old World for feeding silkworms and has escaped from cultivation. The genus *Maclura* contains a single species and is a native of the south-central United States, being much planted for hedges. Some of the Moraceæ are valuable for their fruit, some for their caoutchouc, obtained from their milky juice, and others for their fibre and timber. Among the well-known genera not mentioned above are *Artocarpus* (breadfruit), *Castilloa* (rubber tree), and *Antiaris* (upas tree).

MORADABAD, mō-rŭd′ä-bäd′. A city of British India. See MURADABAD.

MORAES, mō-rīsh′, FRANCISCO DE (c.1500–72). A Portuguese author. Of his life we know only that he was treasurer of the household of John III, member of the suite of the Portuguese Ambassador to Paris, Francisco de Noronha (thus residing in France at least from 1540 to 1544), and Knight Commander of the Portuguese Order of Christ. In 1572 he was murdered at Evora. His great work was the famous romance of chivalry *Palmeirim de Inglaterra* (next to *Amadis de Gaula* the greatest chivalresque novel in the world), which he perhaps wrote as early as 1544 and while in France. The first Portuguese edition did not appear until 1567, however, and as in the meanwhile a Spanish version had appeared in 1548, Moraes was long deprived of the credit of authorship, and his original was called a translation. (See HURTADO DE TOLEDO, LUÍS.) In 1904 the true state of the case was shown by W. E. Purser, of Dublin, in his masterly study *Palmerin of England.* For bibliography, see W. E. Purser, as above, and Inocencio F. da Silva's Portuguese Bibliography.

MORAES BARROS, mō-rīsh′ bär′rôs, PRUDENTE (1841–1902). A Brazilian politician, born at Itú, São Paulo. Having studied law, he entered the National Legislature of the Empire in 1885 and became a leader of the Re-

publican party. Upon the establishment of the Republic he was appointed Governor of the State of São Paulo (1889) and later was President of the first National Congress. In the election of the first President, held by this body, he was defeated by Fonseca (1891), but in 1894 he became the administration candidate and was elected, being the first civilian President. He upheld civil rights, suppressed the prætorian system of government, and checked the power of the military party. He crushed out the revolt in Rio Grande do Sul (1894–95), but in November, 1896, obtained a leave of absence on account of his health. A threatened military revolt caused him to reassume the presidency four months later, thus preventing a coup d'état. In 1897 he brought to a successful conclusion the campaign against the revolt headed by Antonio Conselheiro. An unsuccessful attempt was made on his life in this same year. In the presidential elections of 1898 he supported the candidacy of Manoel Campos Salles, who became his successor.

MORAINE, mô-rān′ (Fr., from It. *mora,* heap of stones, from Bavarian Ger. *mur,* débris). An accumulation of earth and stone carried forward by a glacier. When such materials are heaped up along the margins of a glacier, the lines of débris are called *lateral moraines.* The confluence of glaciers causes a coalescing of the inner lateral moraines, which are then carried forward as *medial moraines.* Débris frozen in the lower part of the glacier and pushed along its bed is called the *ground moraine.* Finally, the materials transported in the various ways accumulate at the lower end of the glacier in irregular mounds constituting *terminal moraines.* The moraınal deposits that resulted from the ice invasion of Pleistocene time are conspicuous features of the landscape in the northern sections of North America and Europe. They are especially marked along the southern border of the area covered by the ice and in places where the latter remained stationary for a long time in the stages of general advance and retreat. The great terminal moraine can be traced nearly across the continent by the lines of kames, drumlins, and other deposits of glacial materials which still retain their original forms and structures. In the east the moraine begins in Nantucket and thence extends across Long Island and Staten Island into New Jersey; crossing the latter State it enters Pennsylvania and follows a northwesterly direction to the New York border and then turns southwest through western Pennsylvania to pass into Ohio, where it reaches nearly as far south as Cincinnati. It then follows a sinuous line across Indiana, Illinois, and Iowa, thence bearing off to the northwest to cross the Dakotas and Montana and to pass into Canada. See GLACIER; PLEISTOCENE.

MORALES, mô-rä′lās, LUÍS DE, called EL DIVINO (c.1510–86). A Spanish painter, born at Badajoz. He is said to have studied in Valladolid or Toledo, but was probably self-taught. His work shows the influence of the early Flemish and of the Milanese school, but is essentially Spanish in its stern and melancholy religious sentiment. He possessed a strong feeling for color and painted with minute finish, but later developed exaggerated mannerisms. His subjects are always religious—hence his sobriquet. Among his finest works are an impressive "Pietà," in the Madrid Academy; a charming "Madonna and Child," in the Bosch collection, Madrid; "Presentation in the Temple" and a "Mater Dolorosa," in the Prado; a fine altarpiece, in the church of Arroyo del Puerco (Estremadura); a "Madonna," in the New York Hispanic Society; an "Ecce Homo," in the gallery of the New York Historical Society.

MORAL′ITY (OF. *moralite,* Fr. *moralité,* from Lat. *moralitas,* morality, character, from *moralis,* relating to manners, from *mos,* custom). The third stage in the development of the modern drama, following upon the mystery and the miracle play (qq.v.). Essentially the morality was ethical teaching cast in dramatic form. According to the usual plot, various personages, each representing a virtue or a vice, contend for dominion over an abstraction called Mankind. The virtues usually win. The serious character of the play was relieved by comic scenes and buffoonery. The leading Vice, a sort of clown, in time became the centre of attraction and is thought to have been the origin of the Fool of Shakespeare's plays. Besides the virtues and vices, however, allegorical personages were introduced, such as Riches, Good Deeds, Death; in fact, any human condition or quality. The French moralities adhered less strictly to these purely abstract qualities, and even the later English authors are more apt to use historical characters celebrated for the vice or virtue in question, as Aristides instead of abstract Justice. Later still, as the passions of the Reformation were stirred up, actual men and women were shown under very thin disguises. In other ways the morality was a distinct advance towards the regular drama. There being no prescribed plot as in the mysteries and miracle plays, it was necessary to create one, with a clear end towards which the action of the characters was to lead up. So close, in fact, did the morality come to the regular drama that it did not cease to be acted in England until almost the end of the reign of Elizabeth. In 1902 and 1903 *Everyman,* perhaps the best morality in English, was performed successfully in England and in the United States by a company of English players under Ben Greet. Though this play lacks swiftness of action, its sincerity is unbroken; its moralizing does not fall into platitudes, and various scenes, e.g., the appeal to Riches, are poignantly dramatic. For bibliography, see MYSTERY.

MORAL PHILOSOPHY. See ETHICS.

MORAN′. A family of American painters. EDWARD (1829–1901), a marine painter, was born in Bolton, Lancashire, England, but removed with his parents in 1844 to Philadelphia, where he became a pupil of James Hamilton and of Paul Weber. After 1862 he studied in England, where he was strongly influenced by Turner, and later on the Continent, returning to reside first in Philadelphia and then in New York from 1869. Among his best works are: "Outward Bound"; "Launch of the Life-Boat" (1865); "Coming Storm in New York Bay"; "Foggy Morning"; "Melodies of the Sea" (1890); "The South Coast of England" (1900). He completed in 1899 a series of 13 historical paintings representing epochs in United States marine history from the landing of Leif Ericson (c.1000) to Admiral Dewey's return (1899). Exhibited at the Metropolitan Museum, New

York, in 1904, they attracted wide attention. (Consult the monograph by their owner, Theodore Sutro, New York, 1905.) Moran was an associate of the National Academy and a member of the Society of American Artists and of the Pennsylvania Academy of Fine Arts.—Edward's son, PERCY MORAN (1862–), became known especially as a painter of Colonial subjects and for his portraits of women. He took the Hallgarten prize in 1886 and the gold medal of the American Art Association in 1888. His "Castle Garden, New York" is in the Wilstach collection, Philadelphia.—Another son, LÉON (1864–), likewise a painter, treats chiefly historical genre subjects.

PETER MORAN (1842–1914), a painter, etcher, and illustrator, studied painting and etching in Philadelphia under his brothers, Thomas and Edward, continuing his studies in England. His taste led him to pastoral and quiet scenes in country life and especially to animal painting. Among his paintings are: "Return of the Herd," which received a medal at the Centennial Exhibition; "Santa Barbara Mission"; "Pueblo of Zia, New Mexico." He was one of the earliest American etchers and received a medal at the Centennial of 1876 for etchings of animals.

THOMAS MORAN (1837–), an etcher, illustrator, and landscape painter, was a younger brother and a pupil of Edward in Philadelphia. During an apprenticeship to a wood engraver he devoted himself to water colors with success, then studied oil painting under James Hamilton and later in Paris and Italy. After his return to the United States in 1871 he made sketches in the Yellowstone, from which he produced the painting "Grand Cañon of the Yellowstone," now filling a panel in the capitol at Washington. In 1873 he joined the United States exploring expedition, conducted by Maj. J. W. Powell, which surveyed the cañons of the Colorado River, and on his return completed a picture of "The Chasm of the Colorado," which was purchased by Congress as a companion of the Yellowstone picture. He established himself in New York and was elected a member of the National Academy in 1884. Among his smaller pieces are "The First Ship," "Ruins on the Nile," and others, in the Wilstach collection, Philadelphia, and "Bringing Home the Cattle," in the Buffalo Museum. Moran designed the illustrations on wood for the reports of both Hayden's and Powell's explorations. His style is a strong souvenir of the works of the English painter Turner, in the iridescent play of color of which he is very fond. He paints the momentary and evanescent phases of nature with much facility of hand and sound scientific knowledge. Both he and his wife and pupil, MARY NIMMO MORAN (1842–), became prominent etchers and members of the British Society of Painter-Etchers.

MORAN, PATRICK FRANCIS, CARDINAL (1830–1911). An Irish Roman Catholic prelate, born at Leighlinbridge, County Carlow. He studied at the Irish College of St. Agatha at Rome and was ordained by special dispensation as to age in 1853. He then served as vice president of the Irish College and as professor of Hebrew in the College of the Propaganda in Rome; in 1866–72 was private secretary to his uncle, Cardinal Cullen, in Ireland; served as Bishop of Ossory in 1872–84; and in 1874–84 held the chair of Hebrew and Scripture at Clonliffe College, Dublin. He went to Australia in 1884 as Archbishop of Sydney, and in the following year he was appointed the first Australian Cardinal. His publications include: *Essays on the Origin of the Irish Church* (1863); *History of the Catholic Archbishops of London* (1864); *Historical Sketch of the Persecutions Suffered by the Catholics of Ireland under Cromwell and the Puritans* (1865); *Irish Saints in Great Britain* (1879); *Letters on the Anglican Reformation* (1890); *History of the Catholic Church in Australia* (1894); *Reunion of Christendom and its Critics* (1896).

MORANDO, mō-rän'dō, PAOLO. See CAVAZZOLA, PAOLO.

MORAN-OLDEN, mō'rän-ōl'den, FANNY (1855–1905). A German soprano singer, born at Oldenburg. She appeared first in Dresden as a concert singer in 1877. The following year she made her début in opera in Frankfort with such success that she afterward sang only in leading rôles. In 1879 she married Karl Moran, leading tenor of the Frankfort Opera. From 1884 to 1891 she was a member of the Leipzig Opera. In 1889–90 she sang the great Wagner rôles at the Metropolitan Opera House. The remarkable range of her voice enabled her to sing rôles so diverse as Elisabeth in *Tannhäuser* and Ortrud in *Lohengrin*.

MORANT, mō-rănt', SIR ROBERT LAURIE (1863–1920). An English educator, born in London and educated at Winchester and at New College, Oxford, where he graduated in 1885. After several years in educational work in England he became tutor to the royal family of Siam and organizer of education in that country. In 1895, after a period of social and educational work in the East End of London, he became Assistant Director of Special Inquiries and Reports in the English Education Department and contributed several reports to this series on education in France, Switzerland, and England. Appointed in 1903 permanent Secretary of the reconstructed English Board of Education, he gave to the administrative control of that board a direction which has been regarded by some as the entering wedge of bureaucracy in England and by others as a necessary step in the development of a strong national system of education. It was his large administrative ability that led in 1911 to his appointment as chairman of the new board of commissioners to administer the National Insurance Act.

MORA STONES. A group of stones near Upsala, Sweden, interesting on account of their historical associations. The kings of Sweden on their election anciently swore fidelity to the laws of the land near these stones, after which the judges, on behalf of the people, took the oath of allegiance to the monarch, whose name was then inscribed on one of the stones. In 1770 the remaining 10 stones were protected by an inclosing building.

MORAT, mō'rä'. A town in the Canton of Fribourg, Switzerland, on the Lake of Morat, 8½ miles north by west of Fribourg (Map: Switzerland, B 2). It is famous for the victory of the Swiss and their allies, 25,000 in number, over Charles the Bold (q.v.), Duke of Burgundy, with an army of 35,000 men, June 22, 1476.

MORATÍN, mō'rä-tēn', LEANDRO FERNÁNDEZ DE (1760–1828). A Spanish dramatist, born in Madrid, the son of Nicolás Fernández de Moratín. A year spent at Paris (as secretary to the Count of Cabarrús, who had been sent on a

difficult mission) had much influence upon the artistic development of the young poet, who was later to make the Molièresque drama successful in Spain. Returning to Madrid in 1788, he gained the favor of the powerful Godoy and was allowed to have his play in verse, *El viejo y la niña*, produced upon the stage at Madrid in 1790. This drama was followed by a more important piece (in prose), the *Café*, also called the *Comedia nueva* (1792), a sharp satire upon the wretched playwrights of the day. At the expense of the government Moratín went abroad to study the foreign stage. From Paris he passed on to London, and after a year in that metropolis, where he began his translation of *Hamlet* (published in 1798), he journeyed through Holland, Flanders, Germany, Switzerland, and Italy. After his return he was for a while a member of the bureau established to reform the theatre. His third comedy, *El barón*, originally written as a zarzuela or vaudeville, was performed in 1803, and the next year witnessed the appearance of a third comedy in verse, the *Mojigata* (The Female Hypocrite). With the *Sí de las niñas*, the second of his prose comedies, he reached the height of his power and fame. Molière was the guiding star of Moratín the Younger in all his dramatic compositions. Yet Moratín displays originality, for he excellently describes the manners of his time and handles dialogue with skill. Though he adhered to the French system of unities, he also adopted certain peculiarities of the native Spanish stage, dividing his plays into three acts, using the favorite short romance verse, and introducing some truly Spanish intrigue into his plots. Taking him for all in all, he was the best dramatist that Spain had had since the *Siglo de oro*. In 1812 Moratín brought out *La escuela de los maridos*, a successful translation of Molière's *Ecole des maris*. At Barcelona, in 1814, there was a representation of his *Médico á palos*, a version of Molière's *Médecin malgré lui*. He was at Bayonne and Bordeaux after 1821, and at Bordeaux he finished his historical account of the Spanish stage, *Orígenes del teatro español*. He died in Paris in 1828. His works may be read in *Biblioteca de autores españoles* (3d ed., vol. ii, Madrid, 1850); his *Obras póstumas* (3 vols., ib., 1867–68); and Ford's edition of the *Sí de las niñas* (Boston, 1899).

MORATÍN, Nicolás Fernández de (1737–80). A Spanish playwright, called the Elder, born in Madrid. He was a teacher as well as a man of letters and had a chair of poetry in the Imperial College. The chief significance of the work of the elder Moratín lies in the fact that he contributed to the success of the principles of literary art imported from France. Spanish literature had greatly degenerated when this reform movement to which Moratín belonged undertook to improve matters by following the rigid rules of French classicism. Moratín illustrated these rules in a comedy, *La petimetra* (printed in 1762), and a tragedy, *Lucrecia*, neither of which appeared upon the stage. His drama *Hormesinda* and his tragedy *Guzmán el bueno* were performed with some success. Of his other productions there may be mentioned the *Diana*, a short poem on the chase; the narrative, or *epic* poem as he called it, *Las naves de Cortés destruidas*, celebrating the burning of his ships by the Conquistador; and the *quintillas* on a bullfight, which are probably his best and his best-known work. Consult his works in volume ii of the *Biblioteca de autores españoles* (Madrid, 1850) and the poem on the bullfight in J. D. M. Ford, *A Spanish Anthology* (New York, 1901).

MORATORIUM, mŏr'ā-tō'rĭ-ŭm (Neo-Lat., neut. sing. of Lat. *moratorius*, relating to delay, from *mora*, delay). An extension of time for the payment of commercial or financial obligations. A moratorium usually takes the form of a legal decree, either by the executive or by the lawmaking body, and may vary as to its scope according to the terms of the decree. In the early history of banking, especially in undeveloped countries, a moratorium frequently applied to the redemption of bank notes in coin and amounted to the suspension of specie payments. With the wider employment of commercial instruments of exchange, however, the chief importance of a moratorium has come to relate to its effect upon bills of exchange, drafts, and bank deposits. While it may extend to all classes of obligations, recent instances of the moratorium have generally excluded from its operations the payment of rent and other household and personal obligations not of a banking character. The language of the Law of Jan. 27, 1910, passed by the French Chambers on the occasion of the floods in Paris was as follows:

"In case of the mobilization of the army, flood, or public calamity, or of the interruption of the public services managed by the government or by the departments or communes, or subject to their control, the Council of Ministers may by decree extend, for the whole or a part of the territory involved, the time within which protests and other acts required to preserve recourse for all negotiable instruments shall be made.

"During the sessions of the Chambers the extensions provided for by this article shall not exceed 30 days; between sessions the extension may be renewed one or several times."

Prior to the European War of 1914, moratoria had been limited chiefly to occasions of public calamities, like the earthquake at Messina in 1908 or the floods in Paris in 1910. It will be observed that the French law quoted extends the recognized occasions for such action to the interruption of railway and tramway communication by strikes, where the lines are operated by the governments. Such delays were authorized also in the Balkan states during the wars in 1912–13. At the outbreak of the War in Europe, however, moratoria were declared more generally than on any previous occasion in modern history. Owing to the cessation of remittances from abroad to meet bills of exchange due in London, a moratorium was declared by the British government on August 4 for 30 days, applying only to bills of exchange running for long terms. This moratorium was twice extended, but finally expired without causing disturbance on November 4. In the meantime, however, the government had authorized the Bank of England to rediscount drafts and bills of exchange drawn prior to August 4 and had given a guarantee to the bank against loss. In France a moratorium was declared, which was continued for several months. In Germany the declaration of a moratorium was avoided in form, but it was provided that balances claimed by foreigners residing abroad, including bills of exchange, could not be sued for in the courts for three months,

but exceptions might be granted for entire nations as well as for individuals. A moratorium was declared for various periods by Italy, Russia, Belgium, Austria-Hungary, Switzerland, Sweden, Norway, Denmark, Portugal, Bulgaria, and other European countries. The cutting off of the credit accommodations usually extended by European bankers compelled such a declaration in Brazil, which continued for several months, and in several other countries of South and Central America.

A moratorium has an important bearing upon the liability on bills of exchange and promissory notes, because its usual effect is that the liability of indorsers on such instruments shall continue in spite of the failure of the holder to present them for payment or to make the usual legal protest in case of nonpayment at maturity. Prior to the international conferences at The Hague on the uniform law of bills of exchange, in 1910 and 1912, no legal recognition was given in several important European countries, including Germany and Switzerland, to obstacles which might prevent presentment and protest of a bill of exchange within the time required by law. By the protocol of the uniform law on bills of exchange, which was signed by the continental Powers on July 23, 1912, the principle was recognized that insurmountable obstacles might arise to the presentment of a bill, and rules were established governing the obligations of the parties in such cases. These regulations involved a possible delay of 30 days, in case the obstacle to presentment was not sooner removed, during which the holder was not permitted to exercise recourse against the indorsers or against the drawer, but an amicable adjustment of the obligation might be made.

It was recognized that it was not within the authority of an international treaty to provide fully for the cases in which the public authority might extend by moratorium the time for presentment and protest of paper, and it was declared that such public acts were binding upon foreign countries only so far as the courts of such countries chose to take them into consideration in passing upon facts. The Protocol of 1912 was ratified by Germany and a few other countries, but was not in actual operation in the majority of continental countries at the outbreak of the war in 1914. Great Britain and the United States were not signers, because of the differences between continental and Anglo-Saxon systems of jurisprudence, but were sympathetic with the adoption of the uniform law among the continental countries and willing to give such weight to its operation in the case of international instruments of exchange as was permissible under their own legal systems.

Consult Reports of the American Delegation to the Conferences on Bills of Exchange and Cheques, Senate Document No. 768, 61st Cong., 3d Sess., and Senate Document No. 162, 63rd Cong., 1st Sess. (Washington, 1913–14); also W. G. S. Schwabe, *Effect of War on Stock Exchange Transactions* (London, 1915).

MORAVA, mō'rä-vä. The largest river of Servia. It is formed by the union at Stolač, Servia, of the southern and the western Morava (Ibar), the former rising on the slopes of Kara Dagh in the newly acquired Servian possessions and the latter near the boundary of Servia with Montenegro (Map: Balkan Peninsula, C 3). The united stream enters the Danube 30 miles east of Belgrade. The Morava is about 240 miles long and is navigable for small boats 50 miles from its mouth.

MORA'VIA (Ger. *Mähren*). A margraviate and crownland of Austria, bounded by Prussian Silesia, Austrian Silesia, Hungary, Lower Austria, and Bohemia (Map: Austria, E 2). Area, 8580 square miles. It is traversed along the northern boundary by the Sudetic Mountains, along the eastern boundary by the Carpathians and the White Mountains, and along the western boundary by the Bohemian-Moravian highlands, which descend in terraces towards the valley of the March. Moravia belongs to the basin of the Danube, and is watered by its tributary, the March, which flows through the centre of the country from north to south. The climate is generally mild. The mean annual temperature is 48° at Brünn. The principal minerals are coal, lignite, graphite, and iron. The output of coal in 1911 was 2,040,574 metric tons and, in 1912, 2,208,853 tons. The mineral output in 1911 was valued at 23,925,206 kronen and, in 1912, at 25,770,847 kronen, over 7 per cent of the value of the mineral production of Austria.

Agriculture is the principal industry, Moravia being one of the foremost cereal-producing parts of Austria. The principal products are rye, oats, barley, wheat, corn, and flax, sugar beets, clover, hay, and grapes. Stock raising is carried on extensively. Among manufactures the woolen industry is especially developed. Other manufactures are those of linen, yarn, cotton goods, leather, sugar, spirits, machinery, railway supplies, tobacco products, etc. The railways had a total mileage of 1311 miles in 1911.

The Landtag is composed of the Prince-Archbishop of Olmütz, the Bishop of Brünn, 30 representatives of the landed aristocracy, 31 representatives of the towns, 6 representatives of the chambers of commerce and industries of Brünn and Olmütz, and 31 representatives of the rural districts. The representatives of the rural districts are indirectly elected. In the Lower House of the Austrian Reichsrat Moravia is represented by 49 members.

At the head of the administration is the Governor, representing the crown. The crownland has a system of district courts, and at Brünn a court of second instance, from which appeals can be made to the Supreme Court at Vienna. Moravia is well provided with educational institutions, and over 98 per cent of its school population attend school. Capital, Brünn (q.v.). In 1890 the population was 2,276,870 (102 per square kilometer); in 1900, 2,437,706 (110); in 1910 (census of December 31), 2,622,271 (118). In 1912 the estimated population was 2,651,300. Of Austrian subjects (2,604,857) in 1910, those whose vernacular was returned as Moravian, Bohemian, or Slovak numbered 1,868,971 (71.75 per cent); German, 719,435 (27.62); Polish, 14,924 (0.57). Roman Catholics in 1910 numbered 2,502,808 (95.45 per cent); Evangelicals (Augsburg and Helvetian), 74,391 (2.83); Jews, 41,148 (1.57). Population of the larger towns in 1910: Brünn, 125,737; Mährisch Ostrau, 36,754; Prossnitz, 31,462; Iglau, 25,914; Witkowitz, 23,151; Olmütz, 22,245; Prerau, 20,669; Znaim, 18,825; Kremsier, 16,528; Oderfurt, 16,462.

History. Moravia was anciently occupied by the Boii and later by the Quadi, who left the country at the time of the great migration of nations. They were succeeded by other Ger-

manic peoples, whose sojourn was temporary, and in the sixth century the region was occupied by Slavs. These peoples took the name of Moravians, from the river Morava. Charles the Great, the ruler of the Franks, held them under nominal subjection, and their King, Samoslav, received baptism; but Christianity was first formally established in the second half of the ninth century by Cyril and Methodius. The ninth century witnessed repeated wars between the Germans and the Moravians. Svatopluk, who ruled over the Moravians from about 870 to 894, built up an extensive but short-lived realm, which soon after his death was crippled by the onslaught of the Magyars. From 1029 Moravia was generally united with Bohemia, either as an integral part of that realm or as a fief ruled by margraves. On the death of Louis II, at the battle of Mohács, in 1526, Moravia, with all the other Bohemian lands, passed under the rule of the house of Austria. In 1849 it was formally separated from Bohemia and declared a distinct province and crownland.

Bibliography. Wolny, *Die Markgrafschaft Mähren topographisch, statistisch und historisch geschildert* (5 vols., Brünn, 1835–40); Dudik, *Mährens allgemeine Geschichte* (12 vols., ib., 1860–88); Bretholz, *Geschichte Mährens* (2 vols., ib., 1893–95), for the early history; Smolle, *Die Markgrafschaft Mähren* (Vienna, 1881); id., *Die österreichisch-ungarische Monarchie in Wort und Bild: Mähren und Schlesien*, vol. xxii (ib., 1897); W. S. Monroe, *Bohemia and the Czechs, together with Accounts of Moravia and Silesia* (Boston, 1910).

MORAVIANS, called also THE UNITED BRETHREN (UNITAS FRATRUM) and THE MORAVIAN CHURCH. An evangelical church which arose in Bohemia and Moravia among followers of John Huss (q.v.); originally known as Bohemian Brethren (q.v.). They secured the episcopacy from the Austrian Waldenses in 1467. Fraternizing with the Reformers of both Germany and Switzerland, they increased rapidly, and after the Schmalkaldic War established a third province in Poland. By 1617 they numbered at least 200,000. With the granting of the Bohemian charter, in 1609, they obtained a legal status, but were systematically suppressed and exiled during and after the Thirty Years' War. Their Polish province, with its centre at Lissa, now acquired importance, and a number of parishes were founded in Hungary. But the Peace of Westphalia excluded Austrian lands from the benefits of religious liberty, and in 1656 Lissa was destroyed in the war between Poland and Sweden. The Polish parishes were gradually absorbed by other Protestant bodies. Meanwhile a "hidden seed" of the Unitas Fratrum remained in Bohemia and Moravia, and their bishop, Johann Amos Comenius (q.v.), republished their history, confession, and discipline, and took steps to perpetuate the episcopate. Hence for about 50 years clergymen who at the same time served parishes of the Reformed church were consecrated bishops of the Unitas Fratrum.

A revival of religious life among the "hidden seed" in Moravia led the awakened to abandon their homes and secretly flee to Saxony to secure religious liberty. Here, in 1722, they began to build the town of Herrnhut on the estate of Count Zinzendorf (q.v.), who had granted them an asylum. Herrnhut became the rallying place for descendants of the Brethren, several hundred of whom migrated from Austrian lands. They introduced the discipline handed down by Comenius, and in 1735 the episcopate was transmitted from its surviving representatives, Jablonski and Sitkovius. The development of the Unitas Fratrum now took a new form. Zinzendorf became the leading bishop and strove to subordinate denominationalism to the promotion of Christian life. He did not permit the church to expand, as other churches expand, nor distinctly to sever connection in every respect with the state church; but established on the Continent, in Britain, and in America an "exclusive system" by which it was attempted to secure a membership solely of converted men and women. Their culture in spiritual life was promoted by exceedingly close supervision, by an abundant supply of the means of grace—daily services and services for the several divisions of the congregation distributively—and by an effort to separate them from the rest of the world. The members of the establishments were indefatigable in missions among the heathen, maintained schools for young people not of their communion, and conducted the so-called Diaspora, or inner mission, among members of the state churches of Germany, the Baltic Provinces, Scandinavian lands, Holland, and Switzerland, seeking the conversion of individuals without drawing them from their former communion.

Though the "exclusive system" was wholly abandoned in America in 1856, and practically so in Britain, while in Germany it has been much modified, the three chief forms of activity continue. Missions among the heathen are maintained in Labrador and Alaska, among the Indians of North America, among the negroes of the West Indies, in Nicaragua, British and Dutch Guiana, Cape Colony, German East Africa, Australia, and among Tibetan people of the Western Himalayas. A home for lepers is maintained near Jerusalem. Thirty-three schools are carried on, in addition to colleges and theological seminaries. The mission in Greenland, maintained since 1733, was transferred to the Danish Lutheran church in 1900.

The Moravian church now consists of four provinces—the German, the British, and the American, North and South—which are united as one body in regard to doctrine, ritual, discipline, and mission work. Internally each province is independent, its affairs being administered by a synod, which elects a provincial executive board consisting of bishops and other ministers. This board appoints the ministers to the various congregations. The executive boards of the four provinces constitute the Directing Board of the Unity. Every 10 years a general synod convenes, each province and the missions having representatives. This synod takes cognizance of the life, doctrine, and activity of the entire church, elects the mission board, and to it the mission board is responsible.

The Moravian church has a complete ritual, including services for the Lord's Day and other forms, but allows free prayer in public worship; its music, vocal and instrumental, is highly developed. It perpetuates the three orders of the ministry, but its bishops, who alone ordain, do not exercise administrative functions ipso facto. It observes the Christian year; admits new converts by confirmation; receives members of other churches by certificate;

encourages lay work; and exercises strict discipline. The cardinal points of Moravian teaching are those held in common by all evangelical churches. Eight cardinal points in regard to which the teaching of Holy Scripture is plain have been repeatedly reaffirmed by the General Synod in the language of Scripture. As formulated by the General Synod of 1899 these doctrines teach: (*a*) total depravity of human nature; (*b*) the love of God the Father, who has "chosen us in Christ"; (*c*) the real Godhead and real humanity of Jesus Christ; (*d*) reconciliation and justification through the sacrifice of Jesus Christ; (*e*) the Holy Ghost and the operation of His grace; (*f*) good works as the fruit of the Spirit; (*g*) the fellowship of believers; (*h*) the second coming of Christ and the resurrection. These truths are held not as a rigidly formulated confession, but as the Moravian conception of the main contents of Christian doctrine. The resuscitated Moravian church has never issued a confession of faith, as such.

The Moravian Church in America. Moravian emigrants went to Georgia in 1735; but five years afterward they removed to Pennsylvania, where they built the towns of Bethlehem and Nazareth. A form of communism was temporarily adopted as a quick mode of subduing the wilderness and at the same time promoting missions. The lands were the property of the church, and the farms and industries were carried on for its benefit; but he who had means of his own retained them; there was no common treasury. This system, "the Economy," continued for 20 years. Each member was pledged to devote his time and powers as they might be best applied for the spread of the gospel, and missionaries went to the Indians of New York, Connecticut, and Pennsylvania, and later Ohio. Though "the Economy" was of short duration, the American division of the church was administered from Germany, and the exclusive policy prevailed until 1856. According to statistics compiled in 1914, the American provinces reported 20,133 communicants and a total membership of 29,375. There were 124 congregations and 110 ministers actively engaged. In the home provinces, including the Bohemian-Moravian mission, there were 45,551 members; in the foreign missions 14 provinces, 156 stations, 187 outstations, and 1503 preaching places, with 367 missionaries, exclusive of secretaries, etc., 111 native missionaries and 2059 other native agents. The communicant membership of the missions was 35,238, with a total membership of 100,606 and a grand total in care of the missionaries of 107,379.

The American Moravians have a theological seminary, founded in 1807, at first as a department added to the academy at Nazareth, begun in 1759, and known as Nazareth Hall. It has been situated at Bethlehem since 1858. A collegiate department preparatory to the theological proper was inaugurated at an early period. Buildings have been erected valued at $120,000, exclusive of the ground. The endowment fund is now $125,000. A six years' course of study is pursued, three and one-half years classical and two and one-half theological. Five professors constitute the permanent faculty. The number of students varies from 50 to 70.

Bibliography. For the period prior to 1722, consult: Gindely, *Geschichte der böhmischen Brüder* (Prague, 1856–57); id., *Ueber des Johann Amos Comenius Leben und Wirksamkeit* (2d ed., Znaim, 1893); E. A. de Schweinitz, *The History of the Unitas Fratrum* (Bethlehem, 1885); W. N. Schwarze, *John Hus, The Martyr of Bohemia* (New York, 1915). For the period since 1722: Cröger, *Geschichte der erneuerten Brüderkirche* (Gnadau, 1852–54); J. T. Hamilton, *A History of the Moravian Church during the Eighteenth and Nineteenth Centuries* (Bethlehem, 1900). For the Moravian church in the United States: Reichel, *The Early History of the Church of the United Brethren in North America* (Nazareth, 1888); J. T. Hamilton, *History of the Moravian Church in the United States*, in the "American Church History Series" (New York, 1895); Schwarze, *History of the Moravian College and Theological Seminary* (Bethlehem, 1909); H. K. Carroll, *Religious Forces in the United States* (New York, 1912). For Moravian missions, consult: Thompson, *Moravian Missions* (New York, 1882); J. T. Hamilton, *History of the Missions of the Moravian Church during the Eighteenth and Nineteenth Centuries* (Bethlehem, 1901).

MORAWETZ, mōr'ȧ-wĕts, VICTOR (1859–). An American lawyer and economist, born in Baltimore. He studied at foreign universities and graduated from Harvard Law School in 1879. Admitted to the bar in 1880, he became attorney for railroad and other corporate interests. He was general counsel and director of the Atchison, Topeka, and Santa Fe and became director of the Norfolk and Western Railway, the New York National Bank of Commerce, etc. The honorary degree of LL.D. was conferred on him by Williams College in 1914. He is author of *Law of Private Corporations* (1882; 2d ed., 1886); *The Banking and Currency Problem in the United States* (1909; 2d ed., 1909); an address on *Evolution of the Interpretation of the Sherman Law* (1914).

MORAY, mō'rȧ. Any of a large group (suborder Calocephali, of order Apodes) of eel-like fishes, especially one of the family Murænidæ and genus *Muræna*. They are degenerate, aberrant eels, distinguished by their small round gill openings and the absence of pectoral fins. They inhabit warm and especially tropical seas, particularly about coral reefs. They are brightly colored, often of large size, and always voracious and pugnacious. Ten or twelve genera are known, embracing about 120 species, among which the true morays (genus *Muræna*) are characterized by the presence of two pairs of nasal barbules. The muræna of the Romans, or murry (*Muræna helena*), abounds in the Mediterranean, and is sometimes of large size, 4 feet or more in length, golden yellow in front and purple towards the tail, beautifully banded and mottled. Its flesh is white and highly esteemed. It prefers salt water, but can accommodate itself to a fresh-water pond. The ancient Romans kept and fed it in vivaria. The story of Vedius Pollio feeding his murænas with offending slaves is well known. Two species of this genus are found in American waters. The common spotted moray, or hamlet, the most numerous eel in the West Indies, is *Lycodontis moringa*, and is yellowish in color, thickly spotted and marbled with dark markings. A larger one (5 to 6 feet) is the greenish-black moray, or morena verde (*Lycodontis funebris*), the biggest and most ferocious of the eels of the American tropics (both coasts), and one well known

about the Florida reefs. The so-called conger eel of California (*Lycodontis mordax*) is a food fish of some local importance. See Plate of Eels, Congers, and Morays.

MORAY, mŭr'â, James Stuart, Earl of. See Murray.

MORAY FIRTH. An arm of the North Sea, extending southwestward into the northeast part of Scotland (Map: Scotland, E 2). It is 16 miles wide at the entrance and about 40 miles long. It forms a good harbor and is navigable for large steamers as far as Inverness. The inner channel, southwest of Fort George, is called Inverness Firth. The name Moray Firth is sometimes extended to the whole of the large, triangular indentation of the shore between Kinnaird and Duncansby heads, having a width of 75 miles.

MORAYSHIRE, mŭr'â-shēr. A maritime county of Scotland. See Elginshire.

MORAZÁN, mō'rä-thän', Francisco (1799–1842). A soldier and statesman, born in Teguagalpa, Honduras. He was a member of a French West Indian family and entered politics when his country became independent of Spain, in 1821. He became Secretary General (1824) and took part in the organization of the new government. He also played an important part at the head of the troops in putting down the demonstrations of the various revolutionary factions, and was in 1830 elected President of the Central American Confederation. In this office he became the foremost representative of liberal principles, as opposed to the reactionary policy of the old Spanish party, whose stronghold was Guatemala. He expelled the archbishop and the friars who were inciting the pro-Spanish faction to revolt, and abolished the most important Church privileges. In 1832 he suppressed an insurrection against the federal government in Salvador. In 1838 a formidable revolution again broke out, headed by Carrera, leader of the conservatives in Guatemala. Morazán, after defending the federal government with courage and ability, felt that the tide was too strong to struggle against; he therefore resigned his office, April 5, 1840, and went to Peru. There he organized a force and in 1842 invaded Costa Rica, hoping to reorganize the Confederation. He overthrew the government without difficulty and was enthusiastically elected Governor. His popularity, however, was short-lived. His advocacy of the Central American Confederation led to another insurrection. He was taken prisoner, court-martialed, and shot, Sept. 15, 1842. Consult H. H. Bancroft, *History of Central America*, vol. iii (San Francisco, 1887).

MORBIHAN, môr'bē'ăN'. A department of west France, situated along the south coast of the peninsula of Brittany (Map: France, N., C 5). It is hilly in the north, very sparsely wooded, while the central portion is distinguished by a marshy tract known as the Landes de la Lanvaux. The belt near the sea is fertile. Only one-third of its area, which covers 2739 square miles, is cultivated, producing cereals, flax, hemp, and apples. Cattle and bees are raised. Iron ore is found, but there are no industries or commerce of any importance save at the naval base, Lorient. There is much fishing along the entire coast. Pop., 1901, 563,468; 1911, 578,400. Capital, Vannes.

MORBILLI, môr-bĭl'lī. See Measles.

MOR'BUS SA'CER. See Epilepsy.

MOR'DANTS (OF., Fr. *mordant*, from Lat. *mordens*, pres. p. of *mordere*, to bite). Substances used in dyeing for the purpose of fixing colors on textile fabrics. The manner in which mordants act has been described under Dyeing. It remains to enumerate here the most important mordants employed by the dyer. Among *basic mordants* may be mentioned alum, aluminium sulphate, ferrous acetate, ferrous sulphate, ferric sulphate, ferric acetate, ferric nitrate, stannous chloride (tin crystals), stannic chloride (the solution is known commercially as cotton spirits), stannic oxide (produced by soaking cotton in a solution of sodium stannate and then passing it through dilute sulphuric acid), potassium (or sodium) bichromate, chromium acetate, and chrome alum. Among the acid mordants may be mentioned tannic acid and the so-called fatty acids. The latter are applied first in the form of their sodium or potassium salts (soaps) dissolved in water; then the fabric is passed through a solution of aluminium sulphate, which combines with the fatty acids to form insoluble aluminium salts on the fibre; finally when a basic dyestuff is applied the aluminium salts react with it, their acids combining to yield permanent colors. See Dyeing; Lakes.

MORDAUNT, môr'dŭnt, Charles, Earl of Peterborough. See Peterborough.

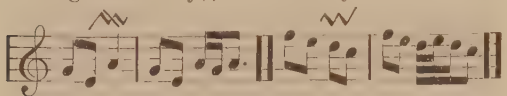
MORDAUNT, Frank (1841–1906). An American actor, born at Burlington, Vt. After playing as an amateur in New York, he joined the theatrical profession in 1859. He supported Mary Anderson in 1878; then Edwin Booth, taking the parts of the King in *Hamlet* and Kent in *King Lear*. Among his later rôles were Tommaso in *Mr. Barnes of New York* (1888), Nicholas Vanalstyne in *The Henrietta* (1889), and General Kendrick in *The Heart of Maryland* (1895).

MORDECAI, môr'de-kī, Alfred (1804–87). An American soldier and military writer, born at Warrenton, N. C. He graduated at West Point in 1823 and remained there the two following years as assistant professor of philosophy and engineering. He was an assistant engineer in fort construction in Virginia (1825–28) and assistant to the chief engineer at Washington. In 1839–60 he was a member of the Board of Ordnance at Washington. For his services in the Mexican War he was made brevet major (1848) and later was promoted major of ordnance (1854). At the outbreak of the Civil War he resigned from the United States army. From 1863 to 1866 he was assistant engineer of the Mexico and Pacific Railroad. In 1867 he became secretary and treasurer of the canal and coal companies controlled by the Pennsylvania Railroad. Mordecai was sent abroad in 1840 and 1855 to investigate European arsenals, ordnance and military organization. In 1860 he assisted in revising the curriculum at West Point. His publications are: *A Digest of Military Laws* (1833); *Report of Experiments on Gunpowder* (1845, 1849); *Artillery for the United States Land Service* (1849); *Ordnance Manual for the Use of the Officers of the United States Army* (1841; 2d ed., 1850); *Report on Military Commission to Europe* (1861).

MOR'DEN. A town and a judicial centre of the electoral district of Lisgar, Manitoba, Canada, situated on Cheval Creek and on the Canadian Pacific and the Great Northern railways, 64 miles southwest (direct) of Winnipeg (Map: Manitoba, E 4). It has a courthouse

and jail, general hospital, isolation hospital, and nurses' home. There are several grain elevators, flour mills, cement-block and pump plants, and a creamery. The surrounding district has cement deposits. The town owns its electric-lighting plant. Pop., 1911, 1130.

MOR'DENT. A musical embellishment consisting of a rapid alternation of the principal note and its second below, indicated by the sign ; or the second above (major or minor, according to the key), indicated by the sign .



MORD'VINS, or **MORDVA.** A mixed Finno-Turkish people numbering about 1,000,000, living in the heart of Russia between the Volga and Oka. In height they average 1.639 meters and are brachycephalic (cephalic index, 83.8). They are divided into two main branches, the Ersa or northern and Moksha or southern. They are finely built and have dark hair—darker in the south than in the north—and blue eyes. Agriculture is their principal occupation, but they are excellent carpenters and woodworkers, selling great quantities of wooden vessels and other objects, and they are noted for beekeeping. Nominally the Mordvins have accepted Christianity, but many interesting pagan customs are preserved among them. The women especially preserve their old national costume, wearing embroidered jackets and skirts, an elaborate coiffure, large earrings, and necklaces. Consult: Mainov, "Rezultaty antropologitcheskih izsledovanii sredi Mordvy-Erzy," in *Memoirs of the Imperial Geographic Society*, ethnographic division, vol. xi (St. Petersburg, 1883); Heikel, *Trachten und Muster der Mordvinen* (Leipzig, 1897); Smirnov, *Les populations finnoises de la Volga* (French trans., Paris, 1898); the grammatical studies of Ahlquist (1861), Wiedemann (1865), Budenz (1876), and Paasonen (1903); and papers in the *Journal de la Societé Finno-ougrienne* and *Finnish-ugrische Forschungen.*

MORE, mōr, HANNAH (1745–1833). An English author, born at Stapleton, near Bristol, Feb. 2, 1745. She was well educated, scribbled essays and verse as a girl, and wrote a pastoral drama (1762). She became acquainted with Garrick, Burke, Reynolds, and Dr. Johnson, and was encouraged by Garrick to write two tragedies, *Percy* (1777) and *The Fatal Falsehood* (1779), both of which met with some success. About 1780 she withdrew from society, built a cottage at Cowslip Green, 10 miles from Bristol, and began writing moral and religious works. *Sacred Dramas* (1782) were succeeded by the extensively read *Thoughts on the Importance of the Manners of the Great to General Society* (1788). With the aid of her sisters she established Sunday schools in the neighboring districts. A successful tract called *Village Politics* (1793) led to the famous *Cheap Repository Tracts* (1795–98), of which 2,000,000 were circulated the first year. Her religious novel *Cœlebs in Search of a Wife* (1809) ran through eight editions the first year, and was still more popular in the United States. She died at Clifton, Sept. 7, 1833. Consult: H. Thompson, *Life of Hannah More* (London, 1838); E. P. Terhune (Marion Harland, pseud.), *Hannah More* (New York, 1900); C. M. Yonge, *Hannah More*, in "Eminent Women Series" (new ed., Boston, 1912).

MORE, HENRY (1614–87). An English theologian. He was born at Grantham, Lincolnshire, of Calvinist parents, but became a warm adherent of the Church of England. After some years at Eton he went to Christ's College, Cambridge, where he pursued the study of philosophy, especially the Platonic writers. About 1639 he took holy orders and lived henceforth a quiet life within the courts of his college, refusing all preferments. His numerous works represent the mysticism of the Cambridge Platonists (q.v.), to which group he belonged. His poems, including the "Song of the Soul," were collected and published as *Philosophical Poems* (1647). The characteristic principles of his philosophy are to be found in the *Divine Dialogues* (1668). Complete editions of his *Opera Theologica* appeared in 1675, and of his *Opera Philosophica* in 1678. Consult his *Life* by Ward (London, 1710) and an analysis of his life and works in Principal Tulloch's *Rational Theology*, vol. ii (Edinburgh, 1872). See the literature noted under CAMBRIDGE PLATONISTS.

MORE, LOUIS TRENCHARD (1870–). An American physicist, brother of Paul Elmer More. He was born in St. Louis, graduated there from Washington University in 1892, and studied at Johns Hopkins, where he took his Ph.D. in 1895. He served as instructor in physics at Worcester Polytechnic Institute in 1896 and as instructor and adjunct professor of physics at the University of Nebraska from 1896 to 1900. In the latter year he became professor of physics at the University of Cincinnati, where he was also dean in 1910–13. Besides papers dealing with electricity, magnetism, light, and sound, he published *The Limitations of Science* (1915).

MORE, PAUL ELMER (1864–). An American essayist, whose scholarly equipment, philosophical grasp, and effectiveness of method have placed him in the front rank of American literary critics. A brother of Louis Trenchard More, he was born in St. Louis, graduated from Washington University, took his A.M. degree at Harvard in 1893, and taught Sanskrit at Harvard for a year and Sanskrit and classical literature at Bryn Mawr from 1895 to 1897. From 1901 to 1903 he was literary editor of the *Independent* and from 1903 to 1914 he held the same position on the New York *Evening Post.* In 1909, in addition, he became editor of the *Nation*, whose high standard he maintained and to which he contributed many valuable reviews and essays in literary criticism. In 1914 he resigned his editorship, though retaining an advisory connection. The body of his critical work is contained in his *Shelburne Essays* (1904 et seq.; vol. viii, 1913), which cover much of English literature and include excursions into other literatures. These volumes take their title from the town of Shelburne, N. H., where the author with a dog and his books for companions spent two years of study. In addition to the eight volumes of essays named above, his work includes: *Helena and Occasional Poems* (1890); *The Great Refusal: Letters of a Dreamer in Gotham* (1894); *A Century of Indian Epigrams* (1898); a translation of the *Prometheus Bound* of Æschylus (1899); *Benjamin Franklin* (1900); *The Jessica Letters* (1904), with Corra Harris (q.v.); *Nietzsche* (1912).

MORE, SIR THOMAS (1478–1535). An English author and statesman. He was born in

London and was educated first at St. Anthony's School, near his home, but at 13 was placed in the household of Cardinal Morton. Morton quickly recognized his gifts and predicted that he would "prove a marvelous man." His interest a year or two later sent the boy to Oxford, where he entered at Canterbury Hall, afterward merged in Christ Church. Here he laid the foundations of the scholarship which made him such an admirable type of the Renaissance learning, under Linacre and Grocyn. Though he left Oxford after two years and studied law at New Inn and Lincoln's Inn, he kept up his literary studies and his friendship with these men and with Erasmus, Colet, and Lilly; with Erasmus, in particular, whom he met in 1497 on his first visit to England, he had a close friendship which was only terminated by death. More at one time thought of becoming a priest and in these days lived a very austere and ascetic life. He lectured on St. Augustine's *De Civitate Dei;* and it is possible that his meditations on the City of God may have suggested his own famous conception of an ideal community in the *Utopia.* Though he abandoned his idea of taking orders about 1503, he remained a fine specimen of the devout layman all his life, though a sharp critic of any shortcomings in the clergy.

In 1504 he entered Parliament and soon gained fame by opposing a large grant of money to the King, Henry VII, whose hostility compelled him to retire to private life. His law practice, however, brought him a large income. When Henry VIII came to the throne he was made undersheriff of London and engaged in a number of important commercial missions, during his absence in Flanders on one of which he began his *Utopia,* published 1516. He was made justice of the peace in 1515, and two years later master of requests, an office which brought him into frequent contact with the King, to whose council he was admitted in the same year. He was knighted in 1521 and continued a prominent figure at court. Attracting the notice of Wolsey, he was recommended by the Cardinal as Speaker of the House of Commons and was elected in 1523.

Though, like Erasmus and Colet, he had much at heart a reform of the Church in practical matters, he had no sympathy with the violent measures of Luther and his followers, and in 1523 appeared as a champion of his sovereign against the German reformer. Thenceforward until his death he was constantly in the lists against the supporters of the new doctrines. On Wolsey's fall in 1529 More was appointed to succeed him as Chancellor, the holding of the office by any but a great ecclesiastic being an unheard-of innovation. He held the office only two years and a half, and then resigned it, foreseeing that his conscience would bring him to an open struggle with the King, whom he had already opposed at several stages of the gradual breach with Rome.

The inevitable conflict came in the spring of 1534, when subscription was required to the act of succession, including a renunciation of the jurisdiction of "any foreign potentate." More flatly refused to take the oath, and was committed to the Tower, where he remained a prisoner until his death. He was brought to trial on a charge of treason, was convicted by the most flagrant perjury and injustice, and was sentenced to be hanged at Tyburn. The King commuted the sentence to beheading. On July 6 he was executed in the Tower, retaining the calmness and wit which had marked his life to the last. His execution shocked the whole of Europe, and Charles V declared that he would rather have lost his best friend than such a counselor. More was beatified by Leo XIII in 1886, together with other English martyrs.

More is to-day best known as the author of the *Utopia* (q.v.). It was written in Latin, so as to reach the learned world, and is full of dramatic skill and fertile invention. The earliest English version, of which five scholarly reprints were published between 1869 and 1893, appeared in 1551, but earlier than this it had been translated into German, Dutch, and Italian. More's English works, principally of a controversial or devotional character, are marked by forcible, nervous, simple style and by an abundance of witty illustration. His *History of Richard III* (first correctly printed in 1557), though incomplete, is notable among the beginnings of modern history in English, and his early biography of Pico della Mirandola (1510) is characteristic of his devotion to the Renaissance ideal.

Bibliography. The basis for all biographies of More is the *Life* by his son-in-law, William Roper, first printed at Paris in 1626, with numerous subsequent editions, a recent one in the "King's Classics" (London, 1903); Cresacre More, his great-grandson, published a fuller biography about 1631 (last ed., London, 1828). Consult also Anne Manning, *The Household of Sir Thomas More* (London, 1851; new ed., New York, 1908); Désiré Nisard, *Renaissance et réforme* (Paris, 1877); T. E. Bridgett, *Life of Sir Thomas More* (London, 1891); W. H. Hutton, *Life and Writings of Sir Thomas More* (ib., 1895); Sir Sidney Lee, in *Great Englishmen of the Sixteenth Century* (New York, 1904); Henri Brémond, *Sir Thomas More*, translated by Harold Child (London, 1904), containing a bibliography; Frederick Seebohm, in *Oxford Reformers* (New York, 1911); *The Book of Sir Thomas More*, in the Malone Society Reprints (London, 1911); Randall Davies, *The Greatest House at Chelsey* (New York, 1914). See COMMUNISM.

MORE'A. The peninsular portion of Greece, connected with the northern half of the country by the narrow Isthmus of Corinth. It was known in ancient times as the Peloponnesus (q.v.), but has been known by its present name since the Middle Ages, if not from as early a period as the fourth century (Map: Greece, D 6). This name is usually said to be derived from *morus*, a mulberry—the outline of the peninsula bearing a resemblance to the leaf of that tree. Others, however, such as Fallmerayer, trace it back to the Slavic word *more*, the sea, which nearly encircles the Morea. See GREECE.

MOREA. One of the Society Islands. See MOOREA.

MORÉAS, mō'rā'ä', JEAN (1856–1910). A French poet and novelist, born in Athens, his real name being Papadiamantopoulos. In 1877 he settled in Paris and about 1882 began to publish his verse in some of the newer reviews. His first volume, *Les syrtes* (1884), cleverly parodied by Beauclair under the title *Les déliquescences,* "par Adoré Floupette, poéte décadent," brought on his school the title of "decadent." In 1886 Moréas published *Les cantilènes.* Moréas repudiated his earlier manner in 1892 for that of the school of Romance, which urged a return to the verbal richness of

old French poetry. For such a task the "grammarian poet" with his thorough knowledge of early French diction and metre was peculiarly fitted. Moréas wrote also: *Le pélegrin passionné* (1891); *Eriphile* (1894); *Les stances* (1898–1902; 2d ed., 1906); *Premières poésies* (1907), combining *Les syrtes* and *Les cantilènes; Esquisses et souvenirs* (1908). With Paul Adam he wrote *Le thé chez Miranda* (1886) and *Les demoiselles Goubert* (1887), practically all he did as a novelist. His tragedy *Iphigénie* was first played in 1903. In 1889 he had written the symbolistic manifesto in *Les premières armes du symbolisme*. See SYMBOLISTS.

MOREAU, mô'rō', GUSTAVE (1826–98). A French painter, born in Paris, where he studied under Picot and Chassériau. In Italy he was influenced by Leonardo da Vinci, Mantegna, and other early Rénaissance masters. He exhibited little, and did not become known until towards the end of his life. The only modern painter with whom he can be compared is Burne-Jones. He left his 800 or more works in water color and oil to his native city to form the Musée Moreau in the Rue de la Rochefoucauld. There his "Prometheus" (1869), "Hesiod and the Muses," "The Apparition," "Leda," "Micornes," and many like subjects furnish fine examples of the weird, morbid imagination, suppressed passion, and brilliant, glittering color that distinguish his peculiar style. In the Luxembourg Museum are "Orpheus," "Jason," the "Rape of Europa," and "Calvary," one of a cycle of religious paintings. From 1892 to 1898 he was a professor in the Ecole des Beaux-Arts. He received the cross of the Legion of Honor in 1875. Consult: Flat, *Le Musée Gustave Moreau* (Paris, 1905); Muther, *A History of Modern Painting* (New York, 1907); Loisel, *L'Inspiration chrétienne du peintre Gustave Moreau* (Paris, 1912).

MOREAU, HÉGÉSIPPE (1810–38). A French poet. He was born in Paris, worked as a typesetter and teacher, and then turned his attention to literature. He suffered the greatest privations and died in a hospital just as his talent began to be appreciated. His works comprise: *La Voulzie*, elegies, and *Contes à ma sœur*, prose romances reminiscent of Nodier, of which the most notable is "Le gui de chêne." His works appeared under the title of *Myosotis* (1838), and his correspondence in the first volume of his *Œuvres complètes* (1890–91).

MOREAU, JEAN VICTOR (1763–1813). A celebrated French general of the revolutionary and Napoleonic period. He was born Aug. 11, 1763, at Morlaix in Brittany, and studied law at Rennes. In 1789 he embraced the cause of the Revolution, and was later chosen to command the battalion of volunteers from his native town. He served under Dumouriez in 1793 and displayed such military talent that in 1794 he was made a general of division. His father was put to death by the guillotine, but Moreau decided that he could not withdraw from the service of his country. When Pichegru (q.v.) fell under suspicion in 1796 the Directory appointed Moreau to the chief command on the Rhine and Moselle. He crossed the Rhine at Kehl, defeated Latour at Rastatt and the Archduke Charles at Neresheim, and drove the Austrians back to the Danube; but, owing to the defeat of Jourdan at Würzburg, he found himself in danger of being cut off from the Rhine, and was obliged to make a desperate effort to regain that river, which he accomplished in the face of great difficulties, fighting two unsuccessful battles at Emmendingen and Hüningen in October. A suspicion of participation in the plots of Pichegru led to his being deprived of his command in 1797, but in 1799 he succeeded Scherer in the command of the army in Italy. By a retreat conducted with consummate skill he saved the French army from destruction, though defeated April 27, 1799, by Suvaroff at Cassano. The Directory deprived him of the chief command and gave it to Joubert, but Moreau remained with the army, and after the death of Joubert at Novi, Aug. 15, 1799, again assumed the command and conducted the troops back to France. The disinterestedness of Moreau's character, his military talent, and his political moderation brought him great popularity. He assisted Bonaparte on the 18th Brumaire and, receiving the command of the Army of the Rhine, gained victory after victory over the Austrians in the campaign of 1800 and on December 3 won the great and decisive battle of Hohenlinden (q.v.). A strong feeling of mutual distrust now arose between Moreau and Bonaparte, and the former retired to his country seat, which became the gathering place of the discontented. He was accused of participation in the plot of Pichegru and Cadoudal (q.v.) against the life of the First Consul, and was arrested, brought to trial, and found guilty on June 10, 1804, although the evidence against him was worthless. But Bonaparte could not venture to condemn him to death, and a sentence of two years' imprisonment was therefore pronounced, which was commuted into banishment. Moreau went to America, where he settled first in New Jersey and later at Morrisville, Pa. Regarding with great dissatisfaction the whole of Bonaparte's career, in 1813 he joined the Emperor of Russia and the King of Prussia in the march against Dresden, where, as he stood with the Emperor Alexander on a height at Räcknitz on August 27, a French cannon ball broke both his legs. Amputation was performed, but he died at Laun in Bohemia, Sept. 2, 1813, and was buried in St. Petersburg. Consult: Beauchamp, *Vie politique, militaire et privée du général Moreau* (Paris, 1814; Eng. trans., London, 1814); Chateauneuf, *Histoire du général Moreau* (Paris, 1814); C. Jahmus, *General Moreau* (Berlin, 1814); Paul Swinin, *Some Details Concerning General Moreau and his Last Moments* (London, 1814).

MOREAU, MARIE JULES EMILE (1852–). A French dramatist, born at Brienon (Yonne). Among his writings are: *Parthénice* (1877); *Camille Desmoulins* (1879); *Bonne année* (1882); *Un divorce* (1884); *Gerfaut* (1886); *Pallas Athéné* (1887), which received the French Academy's grand prize for poetry; *La peur de l'être* (1889); *Le drapeau* (1890); *Madame Sans-Gêne* (1893); *Le capitaine Floréal* (1895); *Madame de Lavalette* (1899); *Eglé* and *Le vert-galant* (1907); *La reine Elisabeth* (1912). In his *Le procès de Jeanne d'Arc* (1909) the rôle of Jeanne was created by Sarah Bernhardt.

MOREAU DE SAINT-MÉRY, de săn-mâ'rē', MÉDÉRIC LOUIS ELIE (1750–1819). A French statesman, born in Martinique. He was a member of the Constituent Assembly in 1790. From 1793 to 1799 he was in the United States because his moderate views brought him into conflict with the Jacobins. He set up as a book-

seller in Philadelphia. He was a Councilor of State in 1800, and administrator of Parma, Piacenza, and Guastalla in 1802–06. Falling out of favor with Napoleon, he lived in poverty till 1817, when Louis XVIII pensioned him. He published *Lois et constitutions des colonies françaises de l'Amérique de 1550 à 1785* and *Description de Saint-Dominique* (Philadelphia, 1796–98). Consult Moreau de Saint-Méry's *Diary of a Voyage to the United States* (New Haven, Conn., 1913), edited, with biographical sketch, by S. L. Mims.

MOREAU-VAUTHIER, mô'rō'-vō'tyā', Gabriel Jean Paul (1871–). A French sculptor, born in Paris. He received several medals and prizes at various expositions, beginning to exhibit as early as 1891. Among his works are: "Dante" (1895); "Flora" (1896); "Sphinx" (1897); "Bretonne" (1898); "The City of Paris," a monumental door (Exposition, 1900); "The Seasons," "Embraces" (1903); "Nymphs and Satyrs," decorative panels (1905); "War," "Faun and Nymph" (1906); the Châlons Monument (1907). He made a number of marble and bronze pieces, "Bacchante," "Nereid," "Molière," "Fortune," "Plenty," for the Elysée Palace, the hôtel de ville, and Père Lachaise Cemetery.

MORECAMBE, mōr'kam. A popular watering place in Lancashire, England, on Morecambe Bay, 3½ miles northwest of Lancaster (Map: England, D 2). It has a pier, promenade, aquarium, people's palace, pavilions, and a golf course. Its climate is mild and healthful. Pop., 1901, 11,798; 1911, 12,131.

MORECAMBE BAY. An inlet of the Irish Sea, on the northwest coast of England (Map: England, C 2). It is about 17 miles long, 10 miles in average breadth, and very shallow.

MOREEN. See Moire.

MOREL, mŏr'ĕl (Fr. *morille*, from OHG. *morhela*, Ger. *Morchel*, mushroom, dim. of OHG. *morahā, morhā*, Ger. *Möhre*, carrot), *Morchella*. The common name of *Morchella esculenta*, which is prized as an edible mushroom, although it is not a mushroom. The genus belongs to the Ascomycetes (q.v.), and the ascocarp is a remarkable fleshy structure, rising above the ground from a usually subterranean mycelium. The surface of this stalked and more or less conical structure is reticulated with irregular pitlike depressions which are lined with the hymenium (q.v.). Morels are reckoned among the best of esculent fungi. The common morel, perhaps the best known, is found in America and in many parts of middle and southern Europe. Its stalk is only about an inch long; the pileus is roundish, oval, oblong, or conical, yellowish or brown. Fresh or dried it is nutritious and not difficult to digest, but is chiefly used in sauces and gravies, on account of its pleasant flavor. See Ascomycetes, and Colored Plate of Edible Fungi with the article Fungi.

MOREL EAR. See Stigma.

MOREL-FATIO, Alfred Paul Victor (1850–). The leading French Hispanist of his time. He was born at Strassburg and completed his studies at the Ecole des Chartes, Paris. From 1875 to 1880 he was attaché of the department of manuscripts of the Bibliothèque Nationale, during which period he prepared his excellent *Catalogue des manuscrits espagnols et portugais de la Bibliothèque Nationale*. For the next five years he was professor at the Ecole Supérieure des Lettres at Algiers. In 1885 he returned to Paris to accept the chair of languages and literatures of southern Europe in the Collège de France. He became also assistant director of Romance philology at the Ecole Pratique des Hautes-Etudes, and secretary of the Ecole des Chartes. In these positions he exercised a great influence over students from many lands, and by his writings he influenced a wide public. In 1894 he was Taylorian lecturer at Oxford University. By Spaniards he came to be regarded as the foreign scholar who best understood that nation. He was elected corresponding member of the Spanish Royal Academy of the Language, and was appointed a Knight Commander of the Order of Charles III, and in his own country became an officer of public instruction, a member of the Institute of France (1910), and a Knight of the Legion of Honor. In addition to the *Catalogue* previously mentioned, the following are the most important of his many publications: translation of the *Grammaire des langues romanes* by Friedrich Diez (1874–76); a critical edition of Calderón's *Mágico prodigioso* (1877); *L'Espagne au XVIe et au XVIIe siècle* (1878); *Libro de los fechos et conquistas del principado de la Morea . . . Chronique de Morée aux XIIIe et XIVe siècles* (1885); *Vie de Lazarillo de Tormes; Etudes sur l'Espagne* (3 vols., 1888–1904; 2d ed. of vols. i and ii, 1895 and 1906); "El Libro de Alijandre," in *Gesellschaft für romanische Literatur*, vol. x (1906); *Recueil des instructions données aux ambassadeurs de France en Espagne; Historiographie de Charles-Quint* (1913). After 1874 Morel-Fatio was a contributor to the *Romania*, and after 1899 one of the directors of the *Bulletin Hispanique*.

MORELIA, mô-rā'lê-à, or Valladolid, vä'-lyä-dô-lēd'. The capital of the State of Michoacan, Mexico, situated in a mountainous region, 6300 feet above sea level and 130 miles west-northwest of Mexico City (Map: Mexico, H 8). The town lies in a fertile valley and is regularly built with many squares and two paseos or promenades. It has a fine cathedral, built in Plateresque style and completed in 1745, and a state capitol built of hewn stone in Byzantine style; other notable buildings are the city hall, the courthouse, and the public library. It has also a number of educational institutions, the most important being the theological seminary and the Colegio San Nicolas de Hidalgo. A good water supply is obtained by a handsome aqueduct, 4 miles long, which was completed in 1789. The chief industries of the town are the manufacture of cotton and woolen goods, palm hats, sugar, pulque, and cheese. Pop., 1900, 37,278; 1910, 40,042. Morelia was founded under the name Valladolid in 1541, and the present name was given it in honor of Morelos. See Morelos y Pavon.

MOR'ELL, George Webb (1815–83). An American soldier, also an engineer and lawyer. He was born at Cooperstown, N. Y., graduated with the highest honors in his class at West Point in 1835, served as assistant engineer from 1835 to 1837, and in June, 1837, left the service to take up railroad building. He became assistant engineer first of the projected Charleston and Cincinnati Railroad and then of the Michigan Central Railroad (1837–40), after which he went to New York City and was admitted to the bar. He was later commissioner of the United States Circuit Court for the southern district of New York (1854–61). After the

outbreak of the Civil War he served for a few months as a colonel of New York militia and chief of staff of Major General Sanford, became a brigadier general of volunteers in August, 1861, served under McClellan throughout the Peninsular campaign, and in July, 1862, was appointed major general of volunteers, though the commission, not being sent to the Senate for confirmation, lapsed in March of the following year. Morell participated in the second battle of Bull Run and in the Maryland campaign of September, 1862, and commanded the forces guarding the upper Potomac from Oct. 30 to Dec. 16, 1862, and the draft rendezvous at Indianapolis, Ind., from December, 1863, to August, 1864. In December, 1864, he was mustered out of service, and afterward until his death lived as a farmer near Tarrytown, N. Y.

MORELL, JOHN DANIEL (1816–91). An English philosopher, born at Little Baddow, Essex. He graduated at Glasgow University in 1840, took his M.A. degree a year later, and then went to Bonn, where he studied theology and philosophy. After his return he became Independent minister at Gosport, but three years later (1845) resigned the position. In 1846 he published his *Historical and Critical View of the Speculative Philosophy of Europe in the Nineteenth Century,* which was highly praised and which led Lord Lansdowne to appoint him inspector of schools, an office which he held until 1876. In 1849 appeared his *Philosophy of Religion,* a work that was widely discussed. Among his other publications are: *On the Philosophical Tendencies of the Age* (1848); *A Grammar of the English Language* (1857); *On the Progress of Society in England as Affected by the Advancement of National Education* (1859); *Philosophical Fragments* (1878). In philosophy he was an eclectic, but inclined towards idealism, while in religion he gradually outgrew the narrow limits of his earlier belief until he came into sympathy with all branches of the Christian Church. Consult R. M. Theobald, *Memorials of J. D. Morell* (London, 1891).

MORELLA, mō-rā'lyȧ. A strongly fortified town of east Spain, in the Province of Castellón, situated among the mountains, 50 miles west of the mouth of the Ebro (Map: Spain, E 2). It is built on a steep hill in the midst of a rough and inaccessible country and is surrounded by walls and towers, the wall being tripled on one side. Pop., 1900, 7078; 1910, 6722.

MORELLA, COUNT OF. See CABRERA, RAMÓN.

MOREL-LADEUIL, mō'rĕl'-lȧ'dĕ'y', LEONARD (1820–88). A French goldsmith and sculptor. He was born at Clermont-Ferrand, was apprenticed in Paris to Antoine Veclite, from whom he learned the art of repoussé, and also studied sculpture under J. J. Feuchère. In 1859 he accepted an offer to work for the English goldsmith's firm of Elkington in Birmingham. Two tazzas in repoussé silver, the vase "Modern Inventions," and the beautiful repoussé table "Dreams" (1862), presented as a wedding gift to the Princess of Wales, soon placed him at the head of his profession. After three years he removed to London, remaining altogether a quarter of a century in England. Skill in execution, grace and harmony in composition, purity of style, refined feeling for ornament, and a sense of the dramatic made Morel one of the greatest masters in the art of repoussé. Among his celebrated works, besides those already mentioned, are the "Shield of Empire" (1852, Royal Artillery Officers' Mess, Woolwich); "Milton Shield," in steel and silver repoussé (South Kensington Museum); a "Pompeian Lady at her Toilet" (plaque executed for the Philadelphia Centennial, 1876); "The Bunyan Shield"; and the Shakespearean plaques, "Merry Wives of Windsor," "Much Ado about Nothing," and "The Merchant of Venice." Consult Morel, *L'Œuvre de Morel-Ladeuil* (Paris, 1904).

MORELLET, mō'r'-lȧ', ANDRÉ, ABBÉ (1727–1819). A French author, born in Lyons. After graduating at the Sorbonne as licentiate in theology he came into possession of a small annuity and thenceforth lived in Paris. He was in sympathy with, and was one of the last of, the Encyclopédistes and was a personal friend of Voltaire. He was made a member of the Academy in 1785, entered the reorganized Institute in 1803, and in 1808 was named deputy from the Seine. He belonged to the school of Turgot in political economy. His numerous works are more remarkable for eloquence, force, and biting wit than for original thought. Among his most powerful pamphlets are: *Théorie du paradoxe* (1775), against Linguet; *Préface de la comédie des philosophes, ou La vision de Charles Palissot* (1760), directed against the Bastille; *Le cri des familles* (1795), a protest against the confiscation of property owned by those condemned by the revolutionary tribunals; *Mélanges de littérature et de philosophie au XVIIIème siècle* (4 vols., 1818), in volume ii of which is "L'Avis de Franklin aux faiseurs de constitution." His other works include *Mémoires sur le XVIIIème siècle et sur la Révolution* (1821). He also translated numerous essays from English, Italian, and Latin. Many of his pamphlets were translated into English.

MORELLI, mō-rĕl'lê, DOMENICO (1826–1901). An Italian historical painter, born in Naples. He studied at the Naples Academy and for a short time in Rome under Overbeck. He was afterward professor at the Naples Academy and, with Philippo Palizzi, became a leader of the Realist movement in Italy, where the younger generation was strongly influenced by his independent and progressive spirit, his love of light and resplendent color, and his bizarre imagination. His most important paintings are "Tasso Reading his Poem to the Three Eleanoras" and the "Iconoclasts," both in the Royal collection, Capodimonte; "Mahomet Praying," in the Trieste Museum; "The Madonna of the Golden Stair"; "Christ in the Wilderness," in the Galleria Moderna, Rome; and "The Temptation of St. Antony." Consult Willard, *Sketch of the Life and Works of Domenico Morelli* (Boston, 1895).

MORELLI, GIOVANNI (1816–91). An Italian art critic, whose researches and attributions were epoch-making for Italian painting. He was born in Verona, passed his youth in Bergamo, studied medicine at Munich, Erlangen, and Berlin, and in 1838 assisted Agassiz in his investigations of glaciers. He took a prominent part as a leader of the volunteers in the Italian revolution of 1848, and was sent as national Envoy to the German Parliament at Frankfort. He was a member of the Italian Parliament in 1860–70 and was made a Senator of the Kingdom in 1873. It was on his recommendation that the government appointed a commission to prepare a law for the conservation of works of art in Italy and to prevent their alienation by

heads of religious and public institutions. Although he refused the post of Minister of the Fine Arts and the directorship of the Florence galleries, he did much to reform the administration of Italian museums and galleries. He is best known for his critical work on Italian painting, published in a popular dialogue form under the pseudonym Ivan Lermoliev. Published at first in the periodicals of Germany, to the scholars of which country his appeal was chiefly directed, it is embodied in *Die Werke italienischer Meister in den Galerien von München, Dresden, und Berlin* (1880). This was subsequently amplified to *Kunstkritische Studien über italienische Malerei* (1890–93), and translated into English by Ffoulkes under the title *Italian Painters: Critical Studies of their Works* (2 vols., 1892). His principles of art criticism, which have since been generally adopted for the identification of Italian and indeed of all paintings, consider not only the important features of facial form and expression, but even emphasize the less important features, such as the hands, and ears, which the painter would render in a certain habitual fashion, little influenced by the model before him. Morelli left an important collection of paintings, rich in the Lombard schools, to Bergamo, which he considered his home.

MORELLY, mō'r'-lē'. A French Socialist of the middle of the eighteenth century. He was born at Vitry-le-Français, taught there, and became an abbé, but of his life nothing more definite is known. His works include *Le prince, les délices du cœur* (1751), in which he describes a ruler who makes his people happy and contented through practical adaption of theoretical philosophy; a poem, *Naufrage des îles flottantes* (1753), which describes an ideal government ruled by the laws of nature; *Le code de la nature* (1755–60), a work long attributed to Diderot, and the forerunner of modern communism. Consult Lichtenberger, *Le socialisme au XVIIIème siècle* (Paris, 1895).

MORELOS, mō-rā'lōs. One of the smallest states of Mexico, situated in the interior and bounded by the State of Mexico with the Federal District on the north and west, Guerrero on the west and south, and Puebla on the east (Map: Mexico, J 8). Area, 2734 square miles. It lies on the south slope of the great central plateau, and its northern part is extremely mountainous. The centre and the south comprise fertile valleys, which are devoted to agriculture. The climate in the north is cold and in the centre and south is hot. The principal agricultural products are sugar cane, rice, coffee, cereals, and fruits. The chief industry is the manufacture of sugar. The first sugar plantation and sugar mill in Mexico were established by Cortés in Morelos. It was the scene of much of the activity of Zapata during the revolutions of 1910 and the years following. The state is traversed by two railway lines and has a considerable trade. Pop., 1900, 160,115; 1910, 179,594. Capital, Cuernavaca (q.v.).

MORELOS. A city of Mexico. See CUAUTLA DE MORELOS.

MORELOS Y PAVON, mō-rā'lōs ē pä-vōn', JOSÉ MARÍA (1765–1815). A Mexican patriot and general, born at Valladolid (now Morelia), Michoacan. Left an orphan by poor parents, he spent the years of early manhood as a mule driver and was 32 years of age before he began his education in the College of San Nicolás, of which Hidalgo was then rector. Having progressed rapidly in his studies, he entered holy orders and became the curé of Carácuaro and Nircupétaro, where he was serving when in 1810 his old rector began the revolt against Spain. He decided to follow the fortunes of Hidalgo and at once won a reputation as a brave fighter and a safe leader. Upon the death of Hidalgo Morelos became the leader of the insurrection and during the following winter (1811–12) waged a successful campaign against the Spaniards in the south and west. From Feb. 19 to May 2, 1812, he, with 4000 men, was besieged in Cuautla by a superior force of Loyalists, but succeeded in escaping with most of his army. He captured Orizaba (Oct. 28, 1812), took Oaxaca by storm (November 25), and successfully besieged and entered Acapulco (Aug. 19, 1813). For the purpose of organizing an independent Mexican government he called a congress at Chilpancingo (September 14), which named him generalissimo of the Patriot army and abolished slavery and religious tithes. On Nov. 6, 1813, Morelos issued, in the name of the Congress of Anáhuac, a Declaration of Independence, declaring that the Congress "has recovered its usurped sovereignty" and that "the dependence upon the Spanish throne is broken and dissolved forever." His star now began to wane. He was defeated by Iturbide at Valladolid (Dec. 23, 1813) and again at Puruarán (Jan. 5, 1814). He retired to Acapulco, but was forced to abandon the town upon the approach of the enemy. The Royalists now drove the revolutionists from place to place, and finally in the battle of Tesmalaca Morelos was defeated and taken prisoner. He was taken to Mexico City, where he was condemned by the Inquisition as "an unconfessed heretic and a traitor to God, the King, and the Pope" and was ordered to be degraded from the priesthood. The military court-martial condemned him to death and he was shot, Dec. 22, 1815. His remains at present repose in the cathedral in Mexico City, and his name and that of Hidalgo are revered throughout the country as the earliest martyrs to the cause of Mexican independence.

MOREN'DO (It., dying away). A musical term, equivalent to decrescendo (q.v.).

MORENO, GABRIEL GARCÍA. See GARCÍA MORENO, GABRIEL.

MORE'PORK. 1. In Australia, a caprimulgine bird (*Podargus cuvieri*, or *strigoides*) of Australia and Tasmania. Like many other nightjars, this bird has a peculiar cry, of two syllables, resembling the words *more pork*, whence the name. It is also called frogmouth on account of its immense opening of the bill. It is remarkable for a habit, when alarmed, of stiffening itself in a fixed attitude, sometimes flat on the log, or rock, or fence rail, where it happens to be, and sometimes erect. Then, as it is dull gray, it looks like an excrescence or projection from the surface, and so escapes casual observation. An extended discourse, illustrated by photographic pictures, will be found upon this example of protective mimicry in Saville-Kent's *Naturalist in Australia* (London, 1897). Several species belong to the genus—all large birds and remarkable in structure for the possession of a pair of powder-down patches on the back at the base of the tail. See Plate with NIGHTJAR.

2. In New Zealand, an owl (*Spiloglaux novæ-zealandiæ*).

MORÉRI, mô'rā'rē', Louis (1643–80). A French scholar, born at Bargemont (Provence). He entered the Church and was made chaplain to the Bishop of Apt in 1673. He published the first edition of his *Grand dictionnaire historique ou le mélange curieux de l'histoire sacrée et profane* at Lyons in 1674. This work is still of importance from a biographical point of view, and has often been translated. The twentieth edition, printed in Paris in 1759, and comprising 10 volumes, is considered the best.

MORESNET, môr'nā'. A town and neutral territory of about 1½ square miles on the borders of Belgium and Prussia and under the double protectorate of those countries, about 5 miles southwest of Aix-la-Chapelle. On either side of its borders are the villages of Prussian Moresnet and Belgian Moresnet. It is mountainous and has valuable zinc deposits. It received an independent constitution after the Vienna Congress of 1815. It attained self-government in 1841 with a burgomaster alternately appointed by Belgium and Prussia. Its population consists of German, Flemish, Dutch, and French. Each inhabitant may choose whether he will do military service and seek legal redress in Germany or in Belgium. Pop. (est.), 3400.

MORETON (mōr'ton) **BAY.** A harbor on the east coast of Queensland, Australia, formed inside the islands of Stradbroke and Moreton (Map: Queensland, H 9). It is about 40 miles long by 17 miles wide and receives the waters of six navigable rivers. Among them is the Brisbane, with the city of Brisbane 25 miles from its mouth.

MORETON BAY CHESTNUT (*Castanospermum australe*). An Australian tree of the family Leguminosæ, which attains a height of about 100 feet, has widespreading branches, pinnate leaves, large racemes of beautiful red and yellow flowers, and pods 6 to 7 inches in length. The seeds are soaked for several days in water, dried and roasted, when they taste like chestnuts, hence the name.

MORETON BAY PINE. See Araucaria.

MORETO Y CABAÑA, mô-rā'tô ē kä-bä'nyä, Agustín (c.1618–69). A Spanish dramatist, born at Madrid. He studied at Alcalá de Henares and then went to Madrid, where he found a friend and patron in Calderón. A volume of his plays appeared at Madrid in 1654. Although inferior to Lope de Vega and to Calderón, he yet takes rank as one of the best dramatists of the latter part of the *siglo de oro*, or golden age. He achieved his real success in the category of dramas styled *comedias de capa y espada*, i.e., dramas of intrigue. Moreto's masterpiece is the play *El desdén con el desdén* (Scorn for Scorn). Borrowing the idea from Lope's *Milagros del desprecio*, he produced a work better artistically than that of the master and most brilliant. In his *Princesse d'Elide* Molière imitated the *Desdén con el desdén*. Another excellent play is *El lindo Don Diego*. Of his historical dramas one of the most interesting is the *Rico hombre de Alcalá*, dealing with Pedro the Cruel as the justice-loving King. Consult: *Comedias escogidas* of Moreto in *Bibliotcca de autores españoles*, vol. xxxix (Madrid, 1873), which also has L. Fernández Guerra y Orbe's essay on him, and *Biblioteca de autores españoles*, vol. lviii (ib., 1884), for his *Gran casa de Austria y divina Margarita* (*Auto Sacramental*); E. Gigas, *Studien og Essays* (Copenhagen, 1898); E. Carrara, *Studio sul teatro ispano-veneto di Carlo Gozzi* (Cagliari, 1910); Cristóbal Pérez Pastor, *Bibliografía Madrileña, Parte iii* (Madrid, 1907); Jaime Mariscal de Gante, *Los autos sacramentales desde sus orígenes hasta mediados del siglo XVIII* (Madrid, 1911).

MORETTO DA BRESCIA, mô-rĕt'tô dä brĕsh'ä (1498–1554). An Italian painter of the Renaissance, the chief master of the Brescian school. His real name was Alessandro Bonvicino and he was born at Brescia, where he obtained his early art education under Fioravante Ferramola. Later he was influenced by Savoldo, Romanino, Lotto, and Titian. In frescoes executed in the chapel of San Giovanni Evangelista at Brescia, painted as early as 1523, he showed himself strong in conception and handling of form and endowed with a genius for color harmony. His works are pervaded by a characteristic cool silvery tone with a fine play of light and shade; they have great simplicity of expression and poetic sentiment. Although by the introduction of secular portrait groups into some of his religious compositions he foreshadows Paul Veronese, he differs from that painter in the gravity of his conception and his reverent religious feeling. Between 1521 and 1544 Moretto executed many paintings in and about Brescia, where his works may best be studied. Among the finest are "Fair Ladies on a Parapet" and "The Vision of Moses," Martenengo Gallery; "Elijah," San Giovanni Evangelista; "Mary Appearing to a Shepherd Boy," in the church of Paitone (Province of Brescia). In 1544 he painted his celebrated "Christ in the House of the Pharisee" for Santa Maria della Pietà, Venice, a work virile in presentation and pleasing in composition. Among other important works are a splendidly heroic "St. Justina," in the Vienna Gallery; an impressive "Entombment" and "Christ in the Desert," in the Metropolitan Museum, New York; a "Madonna with Doves," in the Johnson collection, Philadelphia. His finest portrait is that of an "Ecclesiastic," in the Munich Pinakothek. There are also typical examples in the Berlin Gallery, the National Gallery, London, the Brera, Milan, and the Louvre. Moretto died at Brescia in 1554. Among his pupils the most important was Giambattista Moroni, of Bergamo. Consult Berenson, *North Italian Painters of the Renaissance* (New York, 1907); "Moretto da Brescia," in *Masters of Art*, vol. ix (Boston, 1908); *The Masterpieces of Moretto da Brescia*, in "Painters' Series" (New York, 1910).

MORET Y PRENDERGAST, mô'rĕ' ē prĕn'dĕr-gäst', Segismundo (1838–1913). A Spanish statesman, born at Cadiz. He studied at Madrid University, where he subsequently held the chair of political economy and finance. He was elected to the Chamber of Deputies in 1863, was Minister of the Colonies under General Prim, of Finance under King Amadeus, and of the Interior under Alfonso XII. In 1871 he had been sent as Ambassador to London. In 1885 he was Minister of State, and later again Minister of the Interior. In 1893 he became Minister of Public Works and ad interim Minister of State, taking the place of the Marqués de la Vega de Armijo, who had become President of the Congress. The next year he was made Minister of State. From 1895 to 1898 and again at the time of his death he was

president of the Ateneo Científico, Literario, y Artístico of Madrid. In 1897–98 he was again Minister of the Colonies. Later he served as president of the Congress (1901–02). He became head of a Liberal cabinet in December, 1905. His term of office was signalized by the meeting of the Algeciras Conference (see MOROCCO) and the marriage of Alfonso XIII. He resigned in August, 1906, but was again president of the Council of Ministers in 1909–10. His ability was recognized by his election to membership in the Royal Academy of Moral and Political Sciences and in the Royal Spanish Academy of the Language. He received also the grand cross of the Order of Charles III of Spain. Consult Luís Antón del Olmet and Arturo García Carraffa, "Moret," in *Los grandes españoles*, vol. v (Madrid, 1913).

MO'REY, SAMUEL (1762–1843). An American inventor, chiefly remembered for his attempts to solve the problems of steam navigation. He was born at Hebron, Conn., and lived in Orford, N. H., and Fairlee, Vt. In 1793, after several years of experimenting, he succeeded in constructing a small steamboat, which was propelled at a speed of about four miles an hour by a paddle wheel, which was first put at the prow and later at the stern. It was exhibited on both the Connecticut River and the Hudson. Chancellor Livingston is said to have encouraged Morey by large conditional promises and to have offered him $7000 for a patent covering navigation in the waters about New York; the offer was declined. In 1795 Morey patented a crank-motion steam engine for use in boats. Two years afterward he built at Bordentown, N. J., a boat with a paddle wheel on each side and operated it successfully on the Delaware. He seemed, in fact, to have had the problems of steam navigation practically solved; but misfortunes prevented him from following up his success, and to Robert Fulton went the honor that might otherwise have been Morey's.

MOREY, WILLIAM CAREY (1843–). An American professor and writer on history and political science, born at North Attleboro, Mass. He entered the University of Rochester, but left to volunteer in the Civil War. At its close, having been brevetted major and lieutenant colonel, he returned to college and graduated in 1868. For a year he studied at Rochester Theological Seminary, in 1870–72 he was professor of history and English literature at Kalamazoo College (Michigan), and thereafter he was a member of the faculty of his alma mater, as professor of Latin (1872–77), professor of Latin and history (1877–83), and then professor of history and political science. The degree of D.C.L. was conferred on him by Denison and Rochester. He published, besides numerous papers to be had in reprints: *Outlines of Roman Law* (1884); *Papers and Addresses of Martin B. Anderson* (1895); *Outlines of Roman History* (1900); *The Government of New York* (1902); *Outlines of Greek History* (1903); *Outlines of Ancient History* (1906), revised as *Ancient Peoples* (1915).

MOREY FORGERY. In American political history, the forgery, during the presidential campaign of 1880, of the name of James A. Garfield, the Republican candidate for the presidency, to a letter which was widely used for campaign purposes. The letter, which favored Chinese immigration and purported to be addressed to "H. L. Morey, Lynn, Mass.," was made public in *Truth*, a New York paper, on Oct. 20, 1880, and on the 23d what purported to be a facsimile of the letter was published in the same paper. Garfield immediately denounced the letter as a forgery, but extensive use was made of it by the Democratic campaign managers, and many votes were supposed to have been turned by it from the Republican ticket, especially in the West. Consult Davenport, *History of the Morey Letter* (New York, 1884).

MOR'FILL, WILLIAM RICHARD (1834–1909). An English Slavic scholar. He was educated at Oriel College, Oxford, where he graduated with a first-class in classics in 1855 and in 1889 became reader of Russian. He became professor of Slavonic languages and was appointed curator of the Taylor Institute. His excellent works on Slavic literature, language, and history include: grammars of Polish (1884), Servian (1887), Russian (1889), Bulgarian (1897), and Czech (1898); *Russia* (1880); *Slavonic Literature* (1883); *Story of Russia* (1891; 5th ed., rev., 1904); *Story of Poland* (1893); and a *History of Russia from the Birth of Peter the Great to Nicholas II* (1902).

MORGAGNI, môr-gä'nyĕ, GIOVANNI BATTISTA (1682–1771). A celebrated Italian pathological anatomist, born at Forlì in Romagna. He studied at Bologna, graduating in both medicine and philosophy in 1701. In his twenty-third year he assumed the presidency of an independent medical school. In 1715 he was appointed to fill the chair of anatomy at Padua, where he remained and performed his life work as a pathologist. He is generally regarded as the founder of pathological anatomy, and his book on the *Seats and Causes of Disease* has remained a classic. Morgagni became known wherever the art of medicine was known and practiced. He was made a fellow of the Royal Society of London in 1724; of the French Academy of Science in 1731; of the Imperial Academy of St. Petersburg in 1735; and of the Academy of Berlin in 1754. His more important works are: *Adversaria Anatomica*, published in six parts, the first at Bologna and Padua (1706–19; Leyden, 1741); *In Aurelium Celsum et Quintum Serenum* (Padua, 1704, 1721); *Opuscula Miscellanea* (Leyden, 1763); *De Sedibus et Causis Morborum per Anatomen Indagatis* (Bassano, 1761). His *Opera Omnia* appeared at Bassano in 1765.

MORGAN. See MORGAN THE FAY.

MORGAN, (JAMES) APPLETON (1845–). An American lawyer and author, born in Portland, Me. He graduated at Racine College, Wisconsin (1867), and in law at Columbia (1869), and practiced from 1871 to 1886 in New York. There he founded (1885) the Shakespeare Society, of which he served as president until 1910. He edited, in 20 volumes, the *Bankside Shakespeare* (1888–92), wherein the oldest versions of the text are compared with a view to showing how the plays as they now stand are a growth from the originals, which Shakespeare himself modified, as did others after his death. In defense of his theory Morgan had already published *The Shakespearean Myth* (1880); *A Study in the Warwickshire Dialect* (1884); *Shakespeare in Fact and Criticism* (1884); *Some Shakespearean Commentators* (1885); *Digesta Shakespeareana* (1887). The *Bankside Restoration Shakespeare* appeared in 1905–08 (5 vols.), and in 1911 Morgan published as his autobiography *Forty Years*

of Shakespeare Study and Controversy (Somerville, N. J.). He also published *Macaronic Poetry* (1870), an anthology; *The Law of Literature* (1874); *Legal Maxims* (1877); a genealogy of his family (1880 et seq.); *The People and the Railways* (1888); *Society and the Fad* (1890); and edited several legal works, including *Addison on Contracts* (1875); *Best on the Principles of Evidence* (1876); *Forsyth on Trial by Jury* (1876).

MORGAN, Charles Hill (1831–1911). An American mechanical engineer and manufacturer. He was born at Rochester, N. Y., and was educated at Lancaster and Clinton (Mass.) academies. He worked as a draftsman in 1855–60, was in business at Philadelphia in 1860–64, and then served as superintendent (1864–87) and director (1876–87) of the Washburn and Moen Company, Worcester, Mass. Thereafter he was consulting engineer of the American Wire Company of Cleveland, Ohio, of which he later became vice president and director. He became president of the Morgan Spring Company in 1881 and of the Morgan Construction Company in 1891. In 1900 he served as president of the American Society of Mechanical Engineers.

MORGAN, Conwy Lloyd (1852–). A British zoölogist and psychologist, born in London. He was educated at the Royal Grammar School, Guildford, and at the Royal College of Science. In 1878–83 he was lecturer in English and physical science at the Diocesan College, Rondebosch, Cape Colony. In 1884 he became professor of zoölogy and geology in University College, Bristol, where he was principal from 1887 to 1909 and professor of psychology after 1901. His publications include: *Animal Biology* (1887); *Animal Life and Intelligence* (1890); *Animal Sketches* (1891); *Psychology for Teachers* (1895; rev. ed., 1909); *Habit and Instinct* (1896); *Animal Behavior* (1900); *Introduction to Comparative Psychology* (1901); *The Interpretation of Nature* (1905); *Instinct and Experience* (1912); *Spencer's Philosophy of Science* (1913).

MORGAN, Daniel (1736–1802). An American soldier prominent in the Revolutionary War. He was born in Hunterdon Co., N. J., of Welsh ancestry, removed to Virginia in 1753, served as a teamster under Braddock in 1755, and during an Indian campaign three years later was seriously wounded. He moved to Winchester in 1762 and occupied himself with farming and stock raising, but served as a lieutenant in Pontiac's War and as a captain in Lord Dunmore's War. In 1775 he was put in command of a company of Virginia riflemen, with whom he joined Washington at Cambridge in July. Accompanying Arnold's expedition against Quebec, he served with great efficiency and gallantry, both on the march and in the attack of Dec. 31, 1775, when he was captured by the enemy. He was regularly exchanged before the close of 1776; was appointed colonel of a Virginia regiment, and in 1777 played a most important part in the campaign against Burgoyne. At the first battle of Saratoga (September 19) he was, until Arnold's arrival late in the day, the ranking officer in the field; and in the second battle (October 7) he also took a prominent part. In 1778 he served in New Jersey under Washington, and in June, 1779, dissatisfied with the policy of Congress as regards promotions, he resigned; though in September, 1780, he joined Gates at Hillsboro, N. C., as a brigadier general. He was conspicuous for his ability and energy throughout the Southern campaign, and was in chief command at the battle of Cowpens (q.v.), where he defeated Tarleton. Only 200 of the British escaped, and Morgan by forced marches rejoined Greene, in spite of the vigorous efforts of Cornwallis to head him off. Owing to bodily infirmities he was forced to withdraw from the army in August, 1781. After the war he devoted himself chiefly to farming, though in 1794 for a time, during the Whisky Insurrection, he served as a major general, and in 1796 he was elected to Congress, serving in that body as a Federalist Representative from 1797 to 1799. He died at Winchester, Va., July 6, 1802. Consult Graham, *Life of General Daniel Morgan of the Virginia Line* (New York, 1856), and McConkey, *The Hero of Cowpens* (2d ed., ib., 1885).

MORGAN, Edwin Dennison (1811–83). An American politician, Governor of New York from 1859 to 1863. He was born at Washington, Berkshire Co., Mass.; in 1828 he removed to Hartford, Conn., and in 1836 he settled in New York City, where he met with great success as a merchant. From 1849 to 1853 he was a member of the State Senate. He was a delegate to the first national convention of the Republican party at Philadelphia and was one of the vice presidents of that assembly. His high standing as a business man led to his being chosen chairman of the Republican National Committee. He retained the position until 1864 and ably managed the first three national campaigns in which the party participated. In 1858 he was elected Governor of New York, being the first Republican executive of the State, and was reëlected in 1860. In the latter term it fell to him to supervise and control the sending of New York's quota of troops to the front in defense of the Union, and when he left office in 1863 more than 223,000 volunteers had been enlisted in the Federal service. In 1861, in order that he might better carry out the administration's desires, New York State was made a military district, and he was placed in command with rank of major general of volunteers. From 1863 to 1869 he was a member of the United States Senate, and in 1872 he was again made chairman of the Republican National Committee. He was one of the ablest and most efficient of the "war governors." He gave liberally to Union Theological Seminary, Williams College, and other institutions.

MORGAN, Edwin Vernon (1865–). An American diplomat, born at Aurora, N. Y. He graduated in 1890 from Harvard University, where he was an assistant in history in 1892–94; studied at Berlin in 1891–92 and 1894–95; and was instructor in history at Adelbert College (Western Reserve University), in 1895–98. In 1899 he was secretary to the Samoan High Commission, and afterward he held diplomatic and consular positions at Seoul (Korea), St. Petersburg, and Dalny (Manchuria). He served as United States Minister to Korea in 1905, to Cuba in 1905–10, to Uruguay and Paraguay in 1910–11, and to Portugal in 1911–12. In the latter year he was appointed the first Ambassador from the United States to Brazil.

MORGAN, Fort. See Fort Morgan.

MORGAN, G(eorge) Campbell (1863–). A British Congregational preacher, born in Tetbury, Gloucester, the son of a clergyman. He

was educated in the Douglas School at Cheltenham, was a master in the Jewish Collegiate School at Birmingham from 1882 to 1886, and after two years as a mission preacher was ordained to the Congregational ministry in 1889. He was pastor of churches at Stone (1889–91) and Rugeley (1891–93) in Staffordshire; the Westminster Road Church in Birmingham (1893–97) and the church in New Court, Tollington Park, London (1897–1901). He was well known in America, especially at the Northfield conferences, and in 1901–04 was extension lecturer for the Northfield Bible Conference. In 1904 he became pastor of the Westminster Congregational Chapel, Buckingham Gate, London, and in 1911 also became president of Cheshunt College, Cambridge. He edited the *Westminster Bible Record* and the *Westminster Pulpit*. Among his books are *The Life of the Christian* (1904), *The Analyzed Bible* (1910), and *God, Humanity, and the War* (1914), sermons.

MORGAN, Sir George Osborne (1826–97). An English lawyer and Liberal politician. He was born at Gothenburg, Sweden, studied at Oxford, where he won the Newdigate prize in 1846, graduated at Worcester in 1848, and was civil-law fellow at University College, Oxford, where he was intimate with Arthur Penrhyn Stanley, Sellar, and Clough. Morgan was called to the bar in 1853. He was elected to the House of Commons in 1868, and zealously befriended ecclesiastical and educational reform and the amendment of English land laws. In 1880 he was appointed Judge-Advocate-General during Gladstone's ministry, and in this post carried an army discipline bill which did away with flogging (1881). He was Undersecretary for the Colonies in 1886, remained in the House of Commons until his death, and held the leadership of the Welsh party. He was made Baronet in 1892.

MORGAN, George Washington (1820–93). An American soldier, born in Washington Co., Pa. In 1836 he left college to fight in the Texan War of Independence. In 1841 he entered West Point, but left in 1843, was admitted to the bar and began the practice of law at Mount Vernon, Ohio. Upon the breaking out of the Mexican War he was appointed colonel of the Second Ohio Volunteers, and later became colonel of the Fifteenth United States Infantry. For gallantry at Contreras and Churubusco the Ohio Legislature on his return brevetted him brigadier general and gave him a vote of thanks. He was appointed United States Consul to Marseilles in 1856, and from 1858 to 1861 was United States Minister to Portugal. Returning home upon the breaking out of the Civil War, he was made brigadier general of volunteers, and served for a time under General Buell. He was then put in command of the Seventh Division of the Army of the Ohio, was with Sherman at Vicksburg, and later led the expedition that captured Fort Hindman in Arkansas. Owing to ill health he resigned from the army in 1863. He was the Democratic candidate for Governor of Ohio in 1865, but was defeated. From 1869 to 1873 he served in Congress and was a member of the House committees on foreign affairs, military affairs, and reconstruction. In 1876 he was a delegate at large to the Democratic National Convention at St. Louis.

MORGAN, Sir Henry (c.1635–88). A British buccaneer, born at Llanrhymny, Glamorganshire, Wales. He is said to have been kidnaped at Bristol when a boy and sold as a servant in Barbados, whence after a time he worked his way to Jamaica. There he joined the buccaneers, participated in several of their expeditions, and by 1663 was in command of a privateer of his own. In 1666 he commanded a ship under Edward Mansfield, who captured Santa Catalina, and after the death of that leader Morgan was chosen admiral of the buccaneers. In 1668 he was sent by Modyford, Lieutenant Governor of Jamaica, to Cuba. He took and sacked Puerto Príncipe, and then sailed to Puerto Bello, Panama, which he captured after a brilliant attack. After levying a heavy ransom Morgan sailed for Jamaica. Later in the year he led an expedition which ravaged the entire Cuban coast, and in January, 1669, with a fleet of eight ships, he started on his famous expedition against Maracaibo. The capture and sack of the town was followed by the greatest excesses on the part of the buccaneers, who were surprised in their orgies by the arrival of three Spanish ships of war. Morgan assembled his half-drunken comrades, manned his ships, and after parleying with the Spanish commander suddenly attacked him, totally defeated him, and escaped. Returning to Jamaica, he was lightly reproved by Modyford, and was at once commissioned "commander in chief of all the ships of war in Jamaica." In August, 1670, he ravaged the Cuban and mainland coasts, and in January, 1671, he captured and plundered the city of Panama, one of the richest in Spanish America. On February 14 Morgan withdrew and embarked for Jamaica. The attack had been made after a peace had been arranged between England and Spain, and in April, 1672, Morgan was sent to England on a British frigate; but he took enough gold along with him to secure his vindication, eventually receiving knighthood and high favors from the King, and in December, 1674, was sent back to Jamaica with Lord Vaughan, the new Governor, as Lieutenant Governor and commander in chief of his Majesty's forces in the colony. There he spent the remainder of his life in comparative quiet, and at two different periods served as acting Governor.

Consult: A. O. Exquemeling, *Buccaneers of America* (1684), an interesting contemporary account by one of Morgan's lieutenants, reprinted in the "Adventure Series" (London, 1891); Philip Ayres, *The Voyages and Adventures of Capt. Barth, Sharp, and Others to the South Sea . . . to which is added The True Relation of Sir Henry Morgan, his Expedition against the Spaniards in the West Indies, and his Taking Panama . . .* (London, 1684); James Burney, *History of Buccaneers in America* (ib., 1816; reprinted 1902); F. R. Stockton, *Buccaneers and Pirates of our Coast* (New York, 1898); Appleton Morgan, *Genealogical History of the Family of Morgan* (ib., 1897–1902).

MORGAN, Henry James (1842–1913). A Canadian biographer and historian, born in Quebec. He was educated at Morrin College in his native city and in 1860 entered the public service. In 1873 he became chief clerk in the Department of State and in 1895 retired on a pension. Among his publications are the *Canadian Parliamentary Companion*, established in 1862 and issued until 1876; the *Dominion An-*

nual Register and Review (1878–86); *Tour of H. R. H. the Prince of Wales in Canada and the United States* (1860); *Sketches of Celebrated Canadians* (1862); *The Industrial Politics of America* (1864); *The Place British Americans have Won in History* (1866); *Bibliotheca Canadensis, or A Manual of Canadian Literature* (1867); *The Bench and Bar of Canada* (1878); *Canadian Men and Women of the Time* (1898; new ed., 1912); *Ad Multos Annos: A Tribute to Sir Charles Tupper* (1900); *Types of Canadian Women* (1903); *Canadian Life in Town and Country* (1905), with Lawrence J. Burpee.

MORGAN, môr'gäN', Jacques Jean Marie (1857–). A French archæologist, born at Huisseau-sur-Cosson, Loir-et-Cher. He was educated at the Paris Ecole des Mines and, after a trip in the Indies (1882) and an expedition through the peninsula of Malacca (1884), he spent five years in southern Russia, the Caucasus, and Turkey. In 1892 he was sent to Egypt as director general of the French antiquarian service. There he made valuable discoveries at Ombos and Karnak. Transferred to Persia in 1897, he explored the Pushti Kuh Range and Mesopotamia, discovering the Hammurapi stele. He was in Persia during the troubles of 1905–06. His works include: *Géologie de la Bohème* (1882); *Mission scientifique au Caucase* (1890); *Mission scientifique en Perse* (1894–97); *Recherches sur les origines de l'Egypte* (1896–97); *Compte rendu sommaire des travaux archéologiques, etc.* (1898); *Mémoires de la délégation en Perse* (10 vols., 1901–08); *Les premières civilisations* (1909); *Etude sur la décadence de l'écriture grecque dans l'empire perse sous la dynastie des Arsacides, etc.* (1913).

MORGAN, John (1735–89). An American physician, born in Philadelphia. He graduated from the College of Philadelphia (now University of Pennsylvania) in 1757 and later studied medicine with Dr. John Redman and in London and Edinburgh (M.D., 1763). After visiting Paris, Holland, and Italy, he returned in 1765 to Philadelphia, where he established himself. He was one of the founders of the medical department of the College of Philadelphia and served as professor of the theory and practice of medicine till 1783. Appointed by Congress (1775) physician in chief to the American army and director general of the military hospitals, he joined General Washington in Cambridge. There he found the army without medical supplies and appliances and the medical staff itself of the lowest quality. His endeavor to reorganize the department by making the passing of examinations necessary before entering the army as surgeon made him many enemies and in 1777 he was dismissed by Congress without reason. In 1779, however, upon investigation of a committee, the same body honorably discharged him. He returned to Philadelphia. Dr. Morgan was the first in America to advocate the separation of medicine and pharmacy. His writings include: *A Discourse upon the Introduction of Medical Schools in America* (1765); *Four Dissertations on the Reciprocal Advantages of a Perpetual Union between Great Britain and the American Colonies* (1766); *A Recommendation of Inoculation according to Baron Dimsdale's Method* (1776); *A Vindication of his Public Character in the Station of Director General of the Military Hospitals, etc.* (1777).

MORGAN, John Hartman (1876–). A British publicist and educator, son of a Welsh Congregational minister. He studied at the University College of South Wales, at Balliol College, Oxford, and at Berlin; was a journalist, writing leaders for the Manchester *Guardian* in 1904–05; in 1905 became a London University extension lecturer and lecturer at the London School of Economics; and after two years as lecturer, in 1908 became professor of constitutional law at University College, London. He was Liberal candidate for Parliament for Birmingham in January, 1910, and for West Edinburgh in December of the same year. Besides contributions to the reviews he edited Hallam's *Constitutional History* and wrote: *The House of Lords and the Constitution* (1910); *The Place of a Second Chamber in the Constitution* (1910); *The New Irish Constitution* (1912). In 1915 appeared his translation, with critical introduction and notes, of *The War Book of the German General Staff.*

MORGAN, John Hunt (1825–64). An American soldier, prominent on the Confederate side in the Civil War. He was born at Huntsville, Ala. About five years later his father removed to a farm near Lexington, Ky. During the Mexican War Morgan became first lieutenant of Colonel Marshall's Kentucky regiment of cavalry, but saw little active service. Though he had a prosperous manufacturing business, in 1861 he abandoned it and escaped to the Confederate lines with about 200 men and the guns of the militia company of which he was captain. At first he did irregular duty, chiefly scouting, but was later made captain and placed in command of three companies of cavalry called Morgan's Squadron. With these he did duty in Kentucky and Tennessee, and to some extent in Alabama. He organized the Second Cavalry at Chattanooga in April, 1862, becoming colonel. During the summer he served with General Bragg in Tennessee and captured Lexington, Ky. His success in daring and unexpected raids was so great that he was placed in charge of a cavalry brigade, and after promotion to brigadier general made the "Christmas Raid" into Kentucky, for which he was thanked by the Confederate Congress. In June, 1863, he was ordered to attempt to draw off Rosecrans from Tennessee by an expedition into Kentucky. He exceeded his orders, and, breaking through the Union line in Kentucky, he marched north and northwest to the Ohio River and crossed to the Indiana side. He had with him about 3000 cavalry or mounted infantry and four field-pieces of artillery. He swept around Cincinnati, closely pursued by Generals Hobson and Shackelford and opposed everywhere by the militia. A sudden rise in the Ohio River allowed gunboats to reach Buffington Island and prevented him from recrossing the river. Here about 700 of his men were taken prisoners, two companies succeeded in crossing the river, and he with the remainder set out towards the Pennsylvania border to join General Lee. After an exciting chase he was captured at a place 3 miles south of New Lisbon, Ohio, and was afterward confined in the Ohio State Prison at Columbus. On November 27, with a few companions, he escaped and reached the Confederate lines in safety. In January, 1864, he was authorized to reorganize his cavalry and was assigned to the Department of Southwest Virginia. When relieved he resumed his independent command and captured Mount Sterling and Cynthiana in

Kentucky in June, but was badly defeated by General Burbridge. On September 4, in Greenville, Tenn., he was betrayed by an inmate of the house in which he was sleeping and was shot while attempting to escape. General Morgan cared little for formal military tactics, but in ability to strike silently and unexpectedly and escape before an alarm could be raised he has been excelled by few leaders of cavalry. While he destroyed public property, burned bridges, and usually took the best horses in the country, the outrages committed by him have been much exaggerated. Consult Johnson and Buel (eds.), *The Battles and Leaders of the Civil War* (New York, 1887), and B. W. Duke, *Morgan's Cavalry* (new ed., ib., 1906).

MORGAN, JOHN LIVINGSTON RUTGERS (1872–). An American chemist. Born at New Brunswick, N. J., he graduated from Rutgers College in 1892 and from the University of Munich (Ph.D.) in 1895. He taught chemistry at Stevens Institute in 1895–96 and at the Brooklyn Polytechnic in 1896–97. At Columbia University he served as tutor from 1897 to 1901, as adjunct professor of physical chemistry in 1901–05, and thereafter as professor. He translated from the German of G. Helm *The Principles of Mathematical Chemistry* (1897), and is author of *The Theory of Solution and its Results* (1897); *The Elements of Physical Chemistry* (1899; 5th ed., revised, 1914); *Physical Chemistry for Electrical Engineers* (1906; 2d ed., 1909); and contributions to chemical journals.

MORGAN, JOHN PIERPONT (1837–1913). An American financier and art collector, the son of Junius Spencer Morgan and the grandson of John Pierpont (qq.v.). He was born at Hartford, Conn., April 17, 1837, and died at Rome, March 31, 1913, while abroad for his health. Educated at the English High School, Boston, and at the University of Göttingen, Germany, in 1857 he entered the banking house of Duncan, Sherman & Co. in New York City. In 1860 he became American agent for George Peabody & Co. of London, in 1864 a partner in the firm of Dabney, Morgan & Co., dealers in investment securities, and in 1871 a member of Drexel, Morgan & Co., afterward J. P. Morgan & Co. In the field of international banking and investment he early became a prominent figure, but it was to his leadership in the movement for controlling enterprise in the interest of finance that he owed his later financial primacy. The panic of 1893 greatly disturbed American railway finance, and since the Morgan house had been largely engaged in dealing in railway securities, it was natural that Mr. Morgan should be drawn into the work of reorganizing the embarrassed corporations. In this period Mr. Morgan gained still greater prominence through his organization of a syndicate to take up the issue of bonds negotiated by President Cleveland for the protection of the gold reserve. A second phase of Mr. Morgan's activity consisted in the reorganization of industrial corporations under the form of holding companies. The United States Steel Corporation was the most successful of the industrial organizations created through his efforts. Against his success here must be set the practical failure of the shipping combination and, in the same period, his failure in the Northern Securities Company. In the last decade of his life Mr. Morgan exerted a large influence in the direction of consolidating banking interests through the organization of communities of interest, etc. His work as a financier was characterized by a breadth of vision beyond that of any other American financier, and at times by a large public spirit, as in his work to restore financial stability after the panic of 1893 and his successful efforts to avert widespread disaster in 1907. At the same time it must be admitted that he subordinated other interests unduly to the financial interest. Because of the financial advantages of the mammoth corporation, he exerted his influence to create such corporations even where the legality of the proceeding was very doubtful, as in the Northern Securities case, or where technical conditions did not favor the attempt, as in the case of the shipping combination and the extension of the control of the New York, New Haven, and Hartford Railroad over all competing or coöperating transportation concerns in southern New England. On account of the heavy outlays involved in many of his consolidations and the minor technical advantages offered by them, the effect of much of his activity was to increase financial instability, although the contrary was his aim. The subordination of industry to finance through the placing of bankers upon the directorates of railway and industrial corporations, while calculated to insure financial stability, carried with it incidental disadvantages which led to a powerful popular movement against "interlocking directorates" (q.v.). Several years before his death he gained control of the Equitable Life Assurance Society. In 1912 Mr. Morgan testified before the Pujo Banking and Currency Committee of the House of Representatives, appointed to investigate an alleged "money trust" in Wall Street. It was thought by many that the strain he was under at this time had a permanently harmful effect on his health. The testimony was published in the same year (New York).

During his life Mr. Morgan gave liberally: to Harvard Medical School (more than $1,000,000); to Yale; to various institutions in Hartford, especially the Morgan Memorial Building (which he built) and Trinity College; to the cathedral of St. John the Divine, New York, in connection with which he built a Synod Hall; to his church (St. George's, Stuyvesant Square) for buildings and institutional work; to the Lying-in Hospital, New York (site, buildings, and funds—a total of about $1,500,000); and probably millions in unannounced gifts. His will, however, was not notable for benefactions. The great bulk of his estate, including his art collections, was left to his son J. Pierpont Morgan, Jr. (q.v.). Mr. Morgan owned one of the finest of steam yachts and in 1897–99 was commodore of the New York Yacht Club. The *Columbia*, which twice successfully defended the *America's* cup, was built, equipped, and maintained by him. A trustee of Columbia University, treasurer of the Peabody Educational Fund, and identified with numerous public enterprises, Mr. Morgan received the degree of LL.D. from Yale in 1908 and from Harvard in 1910, and in 1911 was decorated with the grand cross of the Red Eagle of Germany.

Mr. Morgan was the greatest art collector of his day, his collections being the largest, most varied, and many of them individually the most important, owned by a single individual. Indeed, the London *Times* once said of him: "J.

Pierpont Morgan is probably the greatest collector of things splendid and beautiful and rare who has ever lived. There is no one with whom we can compare him, except, perhaps, Lorenzo de' Medici, and he surpasses even that prince in the catholicity of his taste." It should be said that it was the historic and romantic aspects of art rather than the æsthetic that claimed his attention. Among the treasures which he reserved for private enjoyment were a unique collection of important manuscripts and rare and handsomely bound editions of books, for which he built a very beautiful library adjoining his home in New York. In 1913 most of his other collections were placed on exhibition, as a loan, in the Metropolitan Museum of Art (q.v.), of which he was president and to which he gave much of his personal attention. Thirteen galleries had been arranged to house the many rare specimens of Byzantine and Gothic enamels and ivories, small bronzes and marbles of the Italian Renaissance, ecclesiastical metal work, rock crystals, a large collection of Flemish tapestries, one of the finest collections of miniatures in the world, and many paintings by masters of the first rank, particularly old English masters. The important wing of decorative arts in the Museum was made possible by Mr. Morgan's loans and generous donations. His vast collection of porcelains, probably the finest in America, as well as the French furniture and objects of decorative art and the paintings of the celebrated Fragonard room, were sold by his son, early in 1915, the paintings to H. C. Frick (q.v.). Elaborate catalogues of most of his collections were published at the expense of the elder Morgan. For a brief description, consult the catalogue published by the Metropolitan Museum of Art (New York, 1914). For much valuable material on Mr. Morgan's life and his importance in various fields, consult the New York *Evening Post* for March 31, 1913.

MORGAN, John Pierpont (1867–). An American banker, son of John Pierpont Morgan (1837–1913). He was born in New York City and graduated from Harvard University in 1889. He became a member of J. P. Morgan & Co., New York, and of Morgan, Grenfell & Co., London, and a director or officer in many corporations. Upon his father's death he inherited the major portion of his great fortune, including his art collections, and succeeded him as director of the New York Central and Hudson River Railroad. He became a trustee of the New York Trade School and governor of the Peabody Donation Fund of London. In 1913 he was elected a director of the New York, New Haven, and Hartford, but he resigned the next year, when the financial methods of that railroad became generally known and criticized. His house was responsible for very large loans to foreign governments during the European War (1914 et seq.) and also served as chief agent for Belgian relief funds. In 1915 Mr. Morgan sold control of the Equitable Life Assurance Society to Gen. T. Coleman Du Pont, of the powder-manufacturing family. In July of the same year, while at his country place on Long Island, he was shot (but not seriously injured) by a war-crazed fanatic.

His sister, Anne Morgan, devoted herself to philanthropic and social work, especially in connection with the woman's department of the National Civic Federation. Her activity in a variety of good causes brought her a medal from the National Institute of Social Science in 1915. She published *The American Girl* (1915).

MORGAN, John Tyler (1824–1907). An American statesman, born at Athens, Tenn. He was educated in Alabama, whither he removed with his parents in 1833. There he studied law and in 1845 was admitted to the bar. He early won wide repute as a lawyer and campaign speaker, and in 1861 was a delegate from Dallas County to the Alabama State Convention which passed the ordinance of secession, and in May of the same year he enlisted as a private in the Fifth Alabama Infantry, of which he ultimately became lieutenant colonel. In 1862 he recruited the Fifty-first Alabama Regiment and became its colonel. In the next year he was promoted to be brigadier general and in this capacity served with considerable distinction under General Johnston. After the war he resumed his law practice at Selma, Ala., and again entered politics in 1876 as an elector at large on the Tilden ticket. In 1877 he was elected to the United States Senate, of which body he remained a member, receiving his sixth election in 1907. He was one of the foremost leaders of the Democratic party in debate, and, as such, showed himself interested in a great variety of subjects. In 1892 he was appointed a member of the Board of Arbitration to settle the Bering Sea fisheries dispute; and in 1898 he served on the commission to prepare a system of laws for the Hawaiian Islands. For a number of years he was chairman of the committee on foreign relations. During the agitation concerning Cuba, he was an eloquent and popular champion of Cuban freedom. As chairman of the committee on interoceanic canals he strongly favored the Nicaraguan route in preference to that across Panama—a position which caused his removal from the chairmanship.

MORGAN, Junius Spencer (1813–90). An American financier, born at West Springfield (now Holyoke), Mass. He was the father of John Pierpont Morgan. From about 1836 to 1853 J. S. Morgan was in the dry-goods business, for the last two years of this period as member of the firm of J. M. Beebe, Morgan & Co. of Boston, a large house. In 1854 he became a partner in the English banking house of George Peabody & Co. Ten years later he succeeded Peabody as head of the firm and changed its name to J. S. Morgan & Co. Under his direction it became one of the leading private concerns of its kind in the world. Morgan left about $10,000,000. He gave largely to Trinity College, Hartford. In 1836 he married Juliet, the daughter of John Pierpont (q.v.).

MORGAN, Lady (Sydney Owenson) (?1783–1859). A novelist, daughter of Robert Owenson, a theatrical manager. She was born in Dublin on Christmas Day, 1785, if we are to believe her. Croker mischievously alleged that she was born on the Dublin packet in 1775. For a while she mingled with theatrical people or with the mixed society frequented by her father in Dublin. Her father's affairs becoming involved, the clever girl resolved to support the family, first as governess and then as author. In 1812 she married Sir Thomas Charles Morgan, a distinguished surgeon. Though the Morgans lived for the most part in Dublin, they made two continental tours, and often visited London, where they settled in 1839. For her services to literature a government pension was granted to Lady Morgan in 1837. She died

April 14, 1859. Throughout her life Lady Morgan was widely known in society for her wit and her affectations. Her works, comprising novels, travels, and biographies, were savagely attacked by the reviewers, but they brought her a considerable fortune. They were indeed ephemeral, the novels gushing and sentimental or perfervidly patriotic and satirical. Among her novels are: *St. Clair, or the Heiress of Desmond* (1801), a sorry imitation of Goethe's *Sorrows of Werther; The Wild Irish Girl*, a silly rhapsodical book not without descriptive power (1806); *O'Donnell* (1814), Lady Morgan's protest, in the way of fiction, against the penal laws; *Florence M'Carthy* (1816); *The O'Briens and the O'Flahertys* (1827). Of her travels, *France* (1817) was much read and criticized. Her main right to consideration is that she wrote English words for Irish melodies, an example soon followed to their great advantage by Thomas Moore and Stevenson. Consult Fitzpatrick, *Lady Morgan* (London, 1860); *Memoirs of Lady Morgan* (an autobiography), edited by Dixon (ib., 1862); H. S. Krans, *Irish Life in Irish Fiction* (New York, 1903).

MORGAN, Lewis Henry (1818–81). An American ethnologist, born near Aurora, N. Y., Nov. 21, 1818. He graduated from Union College in 1840, and after a course in law, completed in 1844, he formed a successful partnership with his classmate, afterward Judge George F. Danforth, in the city of Rochester. Upon leaving college he organized a society of young men in Aurora styled the Grand Order of the Iroquois. The limits of the Grand Order were to be the territory anciently occupied by the Iroquois, and branch societies were to be established wherever an Iroquois tribe was known to have lived, with chapters standing for the Indian gentes. To show his profound interest in the organization, young Morgan went and lived among the existing tribes, in order to master their social organizations and forms of government. Morgan's scientific interests assumed a more substantial form in the now celebrated work, *The League of the Ho-dé-no-sau-nee or Iroquois* (1851; new ed. by H. M. Lloyd, 1904), in which the author, unconscious of the immense diffusion of the system, traced the social organization, government, daily occupations, and customs of this wonderful league. During this early period Morgan also studied and described the Iroquois art products and implements of daily life in the cabinet of natural history in Albany.

In 1856 Morgan made the acquaintance of Henry and Agassiz, who warmly urged him to continue his studies. In 1858, during a visit to Marquette on business, Morgan discovered, in visiting a camp of Ojibwa, that their system of kinship was essentially the same as among the Iroquois. This was the revelation that determined Morgan's enduring fame. In 1868 the Smithsonian Institution published the result of eight years' uninterrupted research, travel, and correspondence, his *Systems of Consanguinity and Affinity of the Human Family*, a work essential to all studies on primitive sociology. His *Ancient Society* (1877) was a comprehensive and philosophical work, the result of 20 years' pursuit of a unique and engrossing inquiry. This book has exerted a well-nigh unparalleled influence on the conceptions of historians, sociologists, and students of kindred branches of knowledge, while through the championship of such men as Bebel and Engels it has likewise become a popular classic in Socialistic circles. Morgan was not wholly absorbed in ethnological work, but also engaged in political life, serving twice as a member of the New York Legislature. In 1880 he was elected president of the American Association for the Advancement of Science. Besides the works already mentioned he published *The American Beaver and his Works* (1868) and *Houses and House Life of the American Aborigines* (1881). He left $80,000 to help establish a woman's college at the University of Rochester. His death occurred Dec. 17, 1881.

Estimates of Morgan's work have ranged from servile adulation to withering contempt. He was certainly an accurate, painstaking recorder of facts, with a Darwinian faculty for collating related data, and an undoubted sense for the importance of phenomena others neglected. It has been truly said by Dr. Rivers that in the range of science hardly any discovery can be put down more certainly to the credit of one man than Morgan's discovery of the classificatory system of relationship. On the other hand, Morgan fell under the influence of the earlier evolutionists and thus came to sketch a unilinear scheme of cultural development, with a fixed sequence of stages, which is not in accord with the results of later inquiry. Deficient in logical rigor, he failed to realize the inconsistencies in his schemes of evolution and lacked a sense for form, so that his greatest work, *Systems of Consanguinity and Affinity*, is most unattractive, because of its diffuseness, irrelevancy, and clumsy arrangement. Nevertheless, his place in the history of anthropology will ever remain a high one since his labors have been the point of departure for most modern speculation and concrete research on social evolution.

MORGAN, Matthew Somerville (1839–90). An Anglo-American graphic artist and scene painter, born in London. He was first a scene painter alone, but afterward became artist and correspondent for the *Illustrated London News* and subsequently editor and proprietor of the *Tomahawk*. Many of his best comic drawings were done for this journal. Morgan, Burnand, Gilbert, and others founded *Fun*, to which Morgan contributed a number of cartoons on the American Civil War. He came to America in 1870 as special artist for Frank Leslie, the publisher, and was a theatrical manager in New York City for several years. He also managed a lithograph concern in Cincinnati (1880–85), and while there established the Matt Morgan Pottery Company and formed the Art Students' League. His influence in America was greatest in the domain of the poster and of scene painting, in which he showed great skill and originality.

MORGAN, Maud (1864–). An American harpist. She was born in New York City and studied music under her father, George Washbourne Morgan, Alfred Toulmin, and the Belgian harpist, Chevalier Charles Oberthur. She made her début as a harpist in a concert with Ole Bull in 1875; thereafter appeared in all the important American cities; was conductor of the Lenox Choral Society for seven years; and after 1895 served as harpist in Grace Church, New York.

MORGAN, Morris Hicky (1859–1910). An American classical scholar, born at Providence, R. I. At Harvard, where he graduated in 1881

and took the degree of Ph.D. in 1887, he became tutor, then assistant professor, and in 1899 succeeded F. D. Allen in the chair of classical philology. He devoted himself especially to the study of the Roman satirist Persius, Vitruvius, the Roman engineer and architect of the time of Augustus, and to various phases of Roman life. Evidence of his interest in Persius is seen in his *A Bibliography of Persius* (1909). He published papers on Vitruvius in various periodicals and in his *Addresses and Essays* (1910); and his translation of this author, nearly complete at his death, was published, with illustrations and original designs by H. L. Warren, in 1914. He edited also *Eight Orations of Lysias* (1895), and was editor, with W. W. Goodwin and J. W. White, of a school edition of Xenophon, *Anabasis* i–iv, which contains an admirable *Dictionary to the Anabasis*, by Morgan and White (1891, 1896). Consult H. W. Prescott, *Classical Philology*, vol. ii, p. 357 (Chicago, 1910), and B. L. Gildersleeve, *American Journal of Philology*, vol. xxxi, pp. 243–244 (Baltimore, 1910).

MORGAN, Tali Esen (1858–). An American choral conductor. He was born at Llangynwyd, Wales, but came to the United States in 1876. In 1879 he was publisher of the *Cambro-American* at Scranton, Pa., and for six years he edited a prohibition organ, *The People*. He began as a musical conductor in 1874, was engaged by Walter Damrosch in 1887, and after 1888 had charge of the Ocean Grove (N. J.) Festival under Anton Seidl. In 1898 he became manager and director of the Ocean Grove Summer Music Festivals, and later served as conductor of the New York Festival Chorus. He became editor and publisher of the *American Musical Times* and president of the International Correspondence School of Music.

MORGAN, Thomas Hunt (1866–). An American zoölogist, born at Lexington, Ky. He graduated at the State College of Kentucky in 1886 and received his Ph.D. degree at Johns Hopkins in 1891. He was professor of biology at Bryn Mawr College from 1891 to 1904 and thereafter professor of experimental zoölogy at Columbia University. He served as president of the American Society of Naturalists in 1909. His work includes highly important researches in the fields of embryology, regeneration, and heredity, published in various monographs and in such books as *The Development of the Frog's Egg* (1897); *Regeneration* (1901); *Evolution and Adaptation* (1903); *Experimental Zoölogy* (1907); *Heredity and Sex* (1913; new ed., 1915).

MORGAN, William (c.1775–c.1826). An American Mason, whose disappearance under peculiar circumstances in 1826 caused the organization of the Antimasonic party. He was born probably in Culpeper Co., Va., and is said to have served under General Jackson in the defense of New Orleans, and afterward settled in York, Upper Canada, removing thence to Batavia, N. Y. In 1826, shortly after news had spread abroad that he intended, in conjunction with one David C. Miller, to publish a book exposing the secrets of Freemasonry, he suddenly disappeared and, despite much search, was never seen again. It was charged that he had been kidnaped and murdered by Masons, but whether this was true is not known certainly to this day. He was traced with some degree of certainty to Fort Niagara, whither he was said to have been conveyed by Masons in a closed carriage and where he was said to have been imprisoned for a time. It was alleged that, refusing to withdraw his book or to give an oath of secrecy, Morgan was finally drowned by his abductors in Lake Ontario. A body found near Fort Niagara was for some time supposed to be his, but was later shown to be that of another man. It was in reference to this body that Thurlow Weed, recognizing the political value of the Antimasonic excitement, remarked that it was "a good enough Morgan until after election"—a phrase which has since been frequently used in American politics. Concerning Morgan's disappearance, which caused profound excitement throughout the North, much has been written. His book, *Illustrations of Freemasonry, by One of the Fraternity who has Devoted Thirty Years to the Subject*, was published in 1826, and was republished at various times thereafter, sometimes under the title *Freemasonry Exposed and Explained* (new ed., 1912). Consult: Robert Morris, *History of the Morgan Affair* (New York, 1852); S. D. Greene, *The Broken Seal, or Morgan's Abduction and Murder* (Boston, 1870); Mackey and Singleton, *History of Freemasonry*, vol. vi (New York, 1898). See Antimasons.

MORGAN, Sir William (1829–83). An Australian statesman, born in Wilshampstead, England. He went to South Australia in 1848, made some money in the Bendigo gold diggings in 1851, and then settled at Adelaide as a merchant. An independent politician, he was elected to the Legislative Council in 1869 and in 1875 represented the cabinet in that body. After the defeat of the Colton ministry in 1877, which was largely due to Morgan's efforts, he was Chief Secretary under Boucant, and from 1878 to 1881 was Premier, showing much ability and honesty. He was styled the "Cobden of South Australia."

MORGANATIC MARRIAGE (ML. *morganaticus*, relating to the morning, from OHG. *morgan*, Ger. *Morgen*, AS. *morgen*, morning; perhaps connected with OChurch Slav. *mĭrknati*, to become dark, *mrakŭ*, darkness, or with Lith. *merkti*, to blink, Gk. *μαρμαίρειν*, *marmairein*, to shine). When a member of a reigning house, who by law can contract a perfect marriage only with a woman of equal rank, wishes to marry a woman of inferior rank, he may contract what is called a morganatic marriage. In Germany those families that were reigning families at the close of the eighteenth century and that have retained their rank in spite of the loss of political power—the so-called "mediatized houses" or "high nobility"—are similarly restricted in the matter of marriage; and members of these families may also contract morganatic marriages.

A morganatic marriage is not a mere concubinage, nor may it exist simultaneously with a perfect marriage. From the ecclesiastical point of view and from certain legal points of view it is a perfect marriage. It is defective chiefly in public law. The morganatic wife does not acquire and the children do not inherit the rank of the husband and father, although, when the husband is a reigning prince, it is usual to give to the morganatic wife and her children titles of nobility. The children do not succeed to the father's public position, or to the property which goes with that position, or to family property (entailed estates). In some states neither the morganatic wife

nor her children have rights of succession even in the private property of the husband and father, except by testamentary provision or by antenuptial settlements.

The roots of the morganatic marriage go back to early German law. A perfect marriage was concluded only when the husband bought the *mundium*, or marital authority, over his wife, at first by a payment to the father or guardian, later by a settlement upon the wife, which was frequently described as "widowhood." A further gift or settlement upon the wife might be made in the form of a "morning gift" (*Morgengabe, dos morganatica*). In the case of an imperfect marriage without *mundium* only the morning gift was made. The Church, however, treated the imperfect marriage as a marriage, although it was unable to determine the civil results. When an ecclesiastical ceremony took place it was not unusual for the man to give the bride his left hand, whence the name "left-hand marriage." For the history of the morganatic marriage, consult Schröder, *Deutsche Rechtsgeschichte* (1889), pp. 293, 294, and works there cited. For modern law, Niebelschütz, *De Matrimoniis ad Morganaticam* (1851).

MORGAN CITY. A city and port of entry in St. Mary Parish, La., 70 miles west by south of New Orleans, on Morgan's Louisiana and Texas Railroad (Map: Louisiana, G 7). It is on the Intercoastal Canal, on Berwick Bay, and on the Atchafalaya River, which extends from Grand Lake to the Gulf of Mexico, 20 miles distant; has regular steamship connection with important Gulf ports, and has extensive sugar, lumber, fish and oyster, and truck-gardening interests. A trade is also carried on in live stock, fur and hides, moss, canned goods, and sirup. Among the city's noteworthy features are the city hall, courthouse, and high-school buildings, Elks Home, Lawrence Park, and Forts Star and Buchanan. The water works and sewage system are owned by the municipality. Here, on June 23, 1863, Richard Taylor, with about 3000 Confederates, captured the Federal garrison of about 1000, secured property worth $2,000,000, and recaptured a large number of refugee blacks. The city was soon afterward abandoned by the Confederates and reoccupied by Federals. Pop., 1900, 2332; 1910, 5477.

MOR'GANFIELD. A city and the county seat of Union Co., Ky., 23 miles southwest of Henderson, on the Illinois Central and the Louisville and Nashville railroads (Map: Kentucky, C 4). It has tobacco stemmeries and manufactories of carriages and wagons, gates, furniture, tile, brick, flour, etc. St. Vincent's Academy (Roman Catholic) is here, and there is a fine high-school building. The water works are owned and operated by the city. Pop., 1900, 2046; 1910, 2725.

MOR'GANITE. A rose-red variety of beryl (q.v.).

MORGANNWG, môr'gän-nōōg, Iolo. See Williams, Edward.

MORGAN PARK. Formerly a village in Cook Co., Ill., and a residential and educational suburb of Chicago, from the centre of which it was 14 miles distant. Morgan Park was first incorporated in 1884 and became a part of the city of Chicago in April, 1914.

MORGANTE MAGGIORE, môr-gän'tā mā-jō'rā, It. A metrical romance by Luigi Pulci (q.v.).

MOR'GAN THE FAY. An important figure in mediæval romance, whose origin is probably to be traced to Celtic mythology. In the *Vita Merlini*, ascribed to Geoffrey of Monmouth, she is mentioned as the eldest of nine sisters who inhabit the fortunate "Insula Pomorum." She is said to be very learned in the art of healing and to be endowed besides with the mysterious powers of changing shape and of flying like a bird. To her, according to the same account, the wounded Arthur was borne after the battle of Camlan. Morgan played a similar part in romances of other cycles. Thus, in the story of "Ogier le Danois" she receives the aged Ogier in the island of Avalon and restores him to youth; and in the "Orlando Innamorato" of Boiardo there is a long account of her splendid abode at the bottom of a lake. In Italy her name has been popularly applied to a form of mirage. (See Fata Morgana.) In the Celtic romances she is said to be a sister of King Arthur. The origin of her name and character is uncertain. It has been proposed to identify the nine sisters of the "Insula Pomorum" with the nine priestesses of Sena described in the ancient account of Pomponius Mela. From a different point of view Morgan has been connected with the Irish *Muirgen*, better known by the name *Liban*. *Morgan*, like *Muirgen*, may mean "sea-born," and both persons have something to do with the world beneath the waves. But this theory (proposed by Professor Rhys) will not account for all the features of the story. The whole subject has been investigated in a study by Dr. L. A. Paton, who holds that Morgan's name and part, at least, of her characteristics are derived from the Irish *Morrigu*, a kind of battle goddess. Consult Miss Paton's dissertation, *Studies in the Fairy Mythology of Arthurian Romance* (Boston, 1903). For Rhys's view consult his *Arthurian Legend* (London, 1887).

MOR'GANTON. A city and the county seat of Burke Co., N. C., 60 miles by rail east of Asheville, on the Southern Railroad (Map: North Carolina, A 2). It has the State Hospital for the Insane and the North Carolina School for the Deaf and Dumb. It has considerable reputation as a health resort, and contains a private sanitarium. Among the principal manufactories are cotton mills, tanneries, lumber mills, canning and furniture factories, and machine shops. In the vicinity there are deposits of gold and silver. Morganton has adopted the Commission form of government. The water works and electric-light plant are owned by the city. Pop., 1900, 1938; 1910, 2712.

MOR'GANTOWN. A city and the county seat of Monongalia Co., W. Va., 101 miles by rail south of Pittsburgh, Pa., on the Monongahela River and on the Baltimore and Ohio and the Morgantown and Kingwood railroads (Map: West Virginia, D 2). It has a fine courthouse and the West Virginia University (q.v.), established in 1868. There are extensive glassworks, furniture factories, tin-plate, planing, and flour mills, and brick and tile works. The city is in a rich agricultural, timber, natural-gas, and mineral country, coal, iron, limestone, timber, clay, and glass sand being found in large quantities. Cheat River, near here, is a resort of great scenic beauty. Morgantown was incorporated in 1783 by the Legislature of Virginia. Its growth has been rapid. Pop., 1900, 1895; 1910, 9150; 1914 (U. S. est.), 12,239; 1920, 12,127.

MORGARTEN, môr'gär-ten. A mountain slope on the boundary of the cantons of Schwyz and Zug, Switzerland, celebrated as the scene of a victory won by the Swiss forest cantons over a numerically superior force of Austrians, Nov. 15, 1315. The cantons had formed a league in 1291 and took the side of the Emperor Lewis the Bavarian in his struggle against Frederick, the Hapsburg claimant. The latter's brother, Duke Leopold, determined to punish the Swiss who had been subject to the Hapsburg. Little is known of the events of the battle.

MORGEN, môr'gen, CURT VON (1858–). A German soldier and explorer, born at Neisse (Silesia), Prussia. He was educated for the army at Wahlstatt and Berlin and in 1889 took charge of an expedition for the exploration of Kamerun. On November 5 he left Kribi on the coast of Batanga. He discovered the Mbam River, the principal tributary of the Sanaga, and proceeded along the Sanaga as far as Malimba. On June 2, 1890, he again set out from Kribi. During this second expedition he penetrated to Tibati, and thence to Ibi on the Benue, from which point he descended the river to Akassa, on the coast. He returned to Europe, but went again to Africa in 1894 and in 1896–97 fought with the English army against the Mahdi, and in the latter year witnessed the Græco-Turkish War from the headquarters of the Ottoman army. From 1897 to 1901 he acted as military attaché of the German embassy at Constantinople. In 1904 he was raised to the nobility and in 1912 became major general and commander of the Eighty-first Infantry Brigade.

MORGENSTERN, môr'gen-stĕrn, CHRISTIAN (1805–67). A German landscape painter and etcher, born in Hamburg. He studied in his native city under Bendixen, and, after visiting Norway and studying for a time at the Academy of Copenhagen, settled in 1830 at Munich. His early work, in its simplicity and intimate feeling, was unique for that day in Germany and exercised a strong influence over the Munich landscape school. His best paintings are quiet, homely scenes, in sunshine or moonlight, of the Bavarian plateau, the beauties of which he was the first to discover. His mountain landscapes are less noteworthy. He also painted Alsatian views and marines. Among his works in public galleries are: "Mill in Sainte Marie Valley, Alsace" (1836, Hamburg Gallery); "April Day on Lake Starnberg" (1853, Leipzig Museum); "Norwegian Marine" and "Moonlight in Patenkirchen" (both in New Pinakothek, Munich).

MORGENSTERN, LINA (BAUER) (1830–1909). A German social reformer, born at Breslau. At 18 she had organized a league to aid poor school children of Breslau and shortly after her marriage to Dr. Theodor Morgenstern in 1854 a league to aid workingmen, and in 1859 she founded the Berlin Kindergarten Association, of which she was president in 1860–66. The Berlin Public Kitchens established by her in 1866 to relieve economic distress were imitated in other large German cities and constitute her most notable achievement. Frau Morgenstern founded also a society for the protection of illegitimate children, an academy for the instruction of young women in useful arts (1869), the Berlin Workingwomen's Union, and the Berlin Housekeepers' Union (1873). She is author of *Die kleinen Menschen—101 Geschichten* (2d ed., 1864); *Der Kindergarten und die Schule* (1874); *Die Frauen des 19. Jahrhunderts* (3 vols., 1888–91); *Frauenarbeit in Deutschland* (2 vols., 1893); *Das Paradies der Kindheit* (5th ed., 1889); *Universalkochbuch* (7th ed., 1898); *Hilfsbuch zur Gründung, Leitung, und Kontrolle von Volksküchen* (3d ed., 1900); *Der häusliche Beruf* (6th ed., 1902).

MORGENTHAU, HENRY (1856–). An American lawyer, business man, and diplomat, born at Mannheim, Germany. He came to the United States in 1865, studied at the College of the City of New York, and graduated from Columbia Law School in 1877. He was a member of the law firm of Lachman, Morgenthau, & Goldsmith, New York, from 1879 to 1899; served as president of the Central Realty Bond and Trust Company from 1899 to 1905 and of the Henry Morgenthau Company (a realty firm) in 1905–13; and became president of the Herald Square Realty Company and director of the Underwood Typewriter Company. He was president of Mount Sinai Hospital, of the Bronx House settlement, and of the Free Synagogue in New York. An active and prominent member of the Democratic party, a liberal contributor to its funds, and an enthusiastic supporter of Woodrow Wilson, he was made chairman of the finance committee of the Democratic National Committee in the campaign of 1912, and in the following year he was appointed Ambassador to Turkey. After that country had entered the European War in support of Germany and Austria, Morgenthau assumed charge of the British interests in Turkey and won commendation for his vigorous insistance on the observance by the Turkish government of the rights of British refugees.

MORGES, môrzh. A town in the Canton of Vaud, Switzerland, 6 miles west of Lausanne, on Lake Geneva and on a branch of the Jura-Simplon Railway (Map: Switzerland, A 2). There are Reformed and Catholic churches, a college with a Realschule, a casino with a library and a museum of natural history, an industrial school, and a high school for girls. The town contains an old château (twelfth century), once the seat of the Bernese governors and now used as an arsenal, and near by is the château of Vufflens, said to have been erected by Queen Bertha of Swabia. The chief industry is wine making. Pop., 1900, 4438; 1910, 4594, about 500 of whom are Roman Catholics.

MORGHEN, môr'gĕn, RAFFAELLO (1758–1833). An Italian line engraver. He was born at Florence, June 19, 1758, the son of Filippo Morghen, who was his first teacher. He also studied at Rome under Volpato, whose daughter he married in 1781. Morghen worked in conjunction with his father-in-law, assisting him in his engravings of Raphael's paintings, among which "The Miracle of Bolsena" is entirely by Morghen. He was appointed professor at the Academy in Florence in 1793, became a member of the French Institute in 1803, and visited Paris in 1812, at the invitation of Napoleon, who conferred many honors upon him. His best-known works include Francis de Moncade, after Van Dyck; the "Aurora," after Guido Reni; "Madonna della Sedia" and "Transfiguration," after Raphael; "Diana Hunting," after Domenichino; the "Last Supper," after Leonardo. Of special interest also are his portraits of Dante, Petrarch, Boccaccio, Ariosto, Tasso, Alfieri, Raphael, etc. Though possessing great suavity and purity of line and high finish, his work is lacking in color and in spirit, and his great reputation has now

somewhat declined. His life and all his works, comprising 252 plates, are fully described by his pupil Palmerini in *Catalogo delle opere d' intaglio di Raffaello Morghen* (Florence, 1824). See Plate of PETRARCH.

MORGIANA, môr'gĭ-ä'nȧ. A female slave, belonging to Cassius and then to his brother, in "Ali Baba and the Forty Thieves," a story in the *Arabian Nights Entertainments.*

MORGUE (Fr., originally the inner wicket of a prison, where prisoners were kept for some time, that the jailers and turnkeys might view them at their leisure, so as to be able to recognize them when occasion required, from *morguer,* to look at solemnly or sourly, to defy). The name designates a building, erected for this purpose, where the unknown dead found in the territory of a city are kept for a certain period for identification. There is no general rule for the preservation of such bodies, but usually they are placed on ice while the clothes and other property are exposed for view also, together with a short history of the circumstances of finding the body. If there are no legal complications, the body, upon proper identification, is turned over to the claimant. Unclaimed bodies are given to medical institutions or buried at the expense of the city. The name was first given to a building in Paris which in the middle of the fifth century was part of the Châtelet and was used for the keeping and identification of unknown corpses. In 1804 the morgue, after the prisons in the Châtelet had been closed in 1792, was removed to an old, two-story building on the Quai du Marché Neuf, and in 1864 to a building erected for this purpose and situated on the extreme point of the Ile de la Cité. Morgues have been established in all large cities—in Boston, in 1851; in New York, in 1866; in Brooklyn, in 1870; in Chicago, in 1872; in St. Louis, in 1874; etc.

MORHOF, môr'hōf, DANIEL GEORG (1639–91). A German literary historian, born at Wismar. He studied law and the humanities at Rostock, where in 1660 he became professor of poetry. In 1665 he was called to the chair of oratory and poetry at Kiel and in 1673 became also professor of history and in 1680 librarian. His *Opera Poetica* (1677) and *Deutsche Gedichte* (1682) are valueless, but his two prose works, *Unterricht von der Deutschen Sprache und Poesie* (1682) and *Polyhistor* (1688) are of considerable interest in the history of literature. The former contains perhaps the first historical treatment of German grammar and a review of what was then modern European literature. The *Polyhistor,* which deals with general literature and is encyclopædic in scope, marks the first systematic study in Germany of the history of literature. Consult article by Liliencron in the *Allgemeine deutsche Biographie,* vol. xxii, pp. 236 et seq.; also Eymer, *Morhof und sein Polyhistor* (Vienna, 1893).

MORI, mô'rē. The surname of the lords of Chosu in Japan. The chief of the clan was foremost in the antiforeign agitation which sought to close Japan again to the world (1858–67), after the demand for admission made by Commodore Perry, and in 1863 became known through his action in firing upon Dutch and American merchantmen passing through the Straits of Shimonoseki. In consequence, a squadron was formed and the town of Shimonoseki was bombarded. This helped to convince the Japanese that resistance was impossible and that the ancient policy of seclusion must be reversed. Mori continued the agitation, however, directing it against the government of the Shogun, and was one of the chief factors in the restoration of the Emperor to supreme power. Since the revolution of 1868 the clansmen of Chosu have been highly influential in the government, and as active in the adoption of Western civilization as they had been previously in opposition to its introduction.

MORI, ARINORI, or YUREI (1848–89). A native of Satsuma, Japan, and one of the group of young samurai who were prominent in advocating the thorough modernization of the Empire after the restoration of the Emperor. Educated in England, he adopted modern manners in life and thought and broke completely with the past. He held various high positions in the diplomatic and civil services and became finally Minister of Education. He was raised to the peerage in 1889, with the title viscount. When the constitution of Japan was promulgated, giving the Empire its place among progressive peoples, he was assassinated in his own house by a Shinto fanatic, who charged him with violating the sanctity of the shrine in Ise by lifting the curtain before the holy place with his cane.

MORI'AH. The name of the land whither Abraham was commanded to go to sacrifice his son Isaac upon a mountain, according to the Masoretic text of Gen. xxii. 2, and of the mountain upon which Solomon built the temple, according to 2 Chron. iii. 1. It is possible that the Chronicler understood the passage in Genesis as affirming that Abraham's sacrifice was made in Jerusalem. He no doubt found "the mountain of Moriah" as a designation of Zion, and it may already in his time have been popularly interpreted to mean "the mountain of vision," as it was by the Samaritan translator, Symmachus, and by Jerome. At an earlier time it may have been pronounced *moreh Yah* and signified "Yah is an oracle giver," or "the Moriah" may have meant "the oracle." How old this name of the temple mountain is cannot be determined. If the Masoretic text is sound, Gen. xxii. 2 refers to one of the mountains "in the land of Moriah." This particular shrine seems to be called *Yahwe yireh* (Yahwe sees) or *Yahwe yereh* (Yahwe gives oracles). The divine name, however, is not certain, and it may have been *Yireh El* or *Yereh El.* Cheyne looks for this sanctuary in the Negeb (q.v.), and Gunkel thinks that it is identical with the Jeruel near Tekoa mentioned in 2 Chron. xx. 16, though he admits that the distance from Beersheba does not preclude the identification with Jerusalem, and regards Ariel, a name of Jerusalem, as a corruption of Jeruel. It is possible that *Yahwe yereh* is an explanation of the meaning of Moriah, or that "the Moriah," "the oracle," is an appellative designation of a sanctuary also known by the kindred name Jeruel. But it is not certain that the original text in Gen. xxii. 2 had "the land of Moriah." The Syriac version suggests that the original reading was "the land of the Amorites." "Amorites" corresponds to the Assyrian Amurru or Martu, and the dropping of the prosthetic aleph can be easily accounted for. This explanation has the advantage of being based on very excellent ancient testimony to the pre-Masoretic text. Consult: August Dillmann, *Die Genesis* (6th ed., Leipzig, 1892); H. Gunkel, *Genesis* (Göttingen, 1901; 3d ed., 1910); T. K. Cheyne, article "Moriah," in *Encyclopædia Biblica,* vol. iii (New

York, 1902); S. R. Driver, *Genesis* (7th ed., London, 1909); John Skinner, *Genesis* (ib., 1911).

MORIALE, Fra. See Montreal d' Albano.

MORIER, mō'rĭ-ēr, James Justinian (c.1780–1849). A British diplomat, author, and traveler, born at Smyrna. He was educated at Harrow and in 1807 became private secretary in Sir Harford Jones's mission to the Persian court. On May 7, 1809, three months after his arrival at Teheran, he was sent home with dispatches and performed a famous journey; of this he afterward published an account under the title *A Journey through Persia, Armenia, and Asia Minor to Constantinople in the Years 1808 and 1809* (1812). This book enjoyed a great vogue in Great Britain and was translated into French (1813) and German (1815). In 1818 he wrote also *A Second Journey through Persia.* In 1810 he went back to Teheran as Secretary of Legation under Sir Gore Ouseley, and after the latter's return to England in 1814 Morier acted for a time as British representative at the court of Persia. He was recalled in 1815. In 1817 he was pensioned by the government and devoted most of his time thenceforth to literature, in which pursuit he attained such success that Sir Walter Scott styled him the best novelist of the day. His best novels are *The Adventures of Hajji Baba of Ispahan* (1824; new ed., 1914); *Zohrab the Hostage* (1832); *Ayesha, the Maid of Kars* (1834).

MORIER, Sir Robert Burnett David (1826–93). An English diplomatist, born in Paris (where his father was Consul General) and educated at Balliol College, Oxford. After holding several other diplomatic offices, he was appointed chargé d'affaires at Stuttgart in 1871 and at Munich in 1872, whence he was transferred to Lisbon as English Minister (1876) and later to Madrid (1881–84). By close observation, which included not only diplomatic life but the character and opinions of the unofficial classes, he acquired an exceptional knowledge of and insight into German politics. He was often consulted by British statesmen in regard to foreign affairs. When he was Ambassador to St. Petersburg (1884–91) he and Bismarck were bitter enemies, and in 1888 Count Herbert Bismarck charged Morier with furnishing information to Bazaine at the outbreak of the Franco-Prussian War. Time showed that Morier had been innocent and that French spies had gained the information in question. Bismarck's dislike of him sprang from his strong belief that Morier held political secrets which might impede or nullify his (Bismarck's) plans. For this there was some basis in a series of able political letters in the London *Times*, which were attributed to Morier. In 1891 he was transferred to Rome, but was forced by urgent business to remain in Russia, where he did much to smooth relations between that country and England. His health broke down and he died in Montreux, Switzerland.

MORIGI DA CARAVAGGIO, mō'rē-gē dà kȧ'rȧ-väd'jō. See Caravaggio, M. A.

MÖRIKE, mĕ'rĭ-ke, Eduard (1804–75). A German poet. He was born at Ludwigsburg, studied theology at Tübingen, and served as clergyman in many small parishes from 1826 to 1851. From 1851 to 1866 he was professor of German literature in a seminary at Stuttgart. One of the most prominent members of the Swabian school, he first appeared in 1832 with the fantastic tale *Maler Nolten* (revised 1853–75; finished by Julius Klaiber in 1877; 3d ed., 1890), which revealed his imaginative power. His collected *Gedichte* (1838; 11th ed., 1894) are marked not only by the idyllic cast common to the Swabian group, but also by a delicate humor and a classical finish peculiarly their own. His fame now rests on his lyrics and ballads. The exquisitely wrought novelette *Mozart auf der Reise nach Prag* (1856) is one of his finest achievements. His further work includes the *Idylle vom Bodensee* (1846) and the caprice *Das stuttgarter Hutzelmännlein* (1855). Many of the poems are to-day established folk songs. Among the best known are "Frühling lässt sein blaues Band," "Fragst du mich, woher die bange Liebe," and the ballad "Schön Rotraut." Consult the biographies by Notter (Stuttgart, 1875), Klaiber (ib., 1876), Mayne (ib., 1901), Fischer (Berlin, 1901), and Windegg (Stuttgart, 1904); also H. Ilgenstein, *Goethe und Mörike* (Berlin, 1903).

MÖRIKOFER, mĕ'rĭ-kō'fĕr, Johann Kaspar (1799–1877). A Swiss literary and ecclesiastical historian, born at Frauenfeld. He studied at Zurich, taught in his birthplace, and was pastor at Gottlieben from 1851 to 1869. His historical works have scientific value and literary charm; they include *Die schweizerische Mundart im Verhältnis zur hochdeutschen Schriftsprache* (1838); *Klopstock in Zurich* (1851); *Die schweizerische Litteratur des achtzehnten Jahrhunderts* (1861); *Ulrich Zwingli nach den urkundlichen Quellen* (1867–69); *Geschichte der evangelischen Flüchtlinge in der Schweiz* (1876). Consult *Allgemeine deutsche Biographie,* vol. xxii, pp. 258 et seq., and vol. xxiv, pp. 787 et seq.

MORILLO, mō-rē'lyō, Pablo, Count of Cartagena and Marquis de la Puerta (1778–1837). A Spanish general. He was born in Fuentesecas in the Province of Toro and entered the Spanish navy in 1791. During the war against Napoleon he raised a guerrilla corps, at the head of which he soon acquired fame and became lieutenant general. In 1815 he was placed in command of 10,000 men and sent to South America to conquer the insurgent provinces of Venezuela and New Granada. He captured Carácas, Cartagena, and Bogotá, but met reverses later and was compelled to sign the armistice of Truxillo with Bolívar (1820). He returned to Spain, joined the court party, and was believed to be one of the authors of an insurrection of the guards in 1822. After this he went over to the patriots, obtained command of an army corps, changed back again, and submitted to the French (1823). Exiled by Ferdinand, he was recalled in 1832 and led an army against the Carlists. He published his *Mémoires,* translated into French by Ernest de Blossville (Paris, 1826), and two other documents, *Manifiesto que hace á la nación española . . . Pablo Morillo . . . con motivo de las calumnias . . . publicadas . . . en la Gaceta de la Isla de León* (Madrid, 1821) and *Contestación . . . al dictamen que . . . ha presentado la mayoría de la comisión de medidas* (Madrid, 1823). The best biography is that by Antonio Rodríguez Villa, *Don Pablo de Morillo . . . estudio biográfico documentado* (Madrid, 1908–1910).

MORIN, mō'răN', Arthur Jules (1795–1880). A French soldier and mathematician, born in Paris. He studied at the Ecole Polytechnique and at the Ecole d'Application in Metz. Commissioned in 1819 lieutenant in an engineer battalion, Morin rose to the rank of general of

a division in 1855. He was professor at the Conservatoire des Arts et Métiers, and after 1852 its director. In 1843 he became a member of the Academy of Sciences. His researches and inventions contributed materially to the progress of mechanics. The results of his labors are embodied in memoirs published in the *Comptes rendus de l'Académie des sciences de Paris*, and in a number of separate publications, among which are: *Hydraulique* (1837; 3d ed., 1865); *Aide-mémoire de mécanique pratique* (1838; 6th ed., 1871); *Notions fundamentales de mécanique et données d'expérience* (1850; 3d ed., 1860; Eng. trans. by J. Bennet, *Fundamental Ideas of Mechanics and Experimental Data, etc.* New York, 1860); *Etudes sur la ventilation* (1863); *Salubrité des habitations* (1868; 2d ed., 1874).

MORIN, Augustin Norbert (1803–65). A Canadian jurist and statesman, born at St. Michel, Quebec, and educated at Quebec Seminary. He studied law in Montreal and in 1828 was admitted to the bar. Elected to the Legislative Assembly of Quebec in 1830, he soon became conspicuous as a Liberal and in 1834 was deputed by the Assembly to go to England with Denis Benjamin Viger (q.v.) and inform the ministry in London as to the political condition of the province. After the union of Upper and Lower Canada in 1841 he was elected to the Canada Legislative Assembly and was Commissioner of Crownlands in the La Fontaine-Baldwin administration (1842–43). He was again a member of the Assembly (1844–48) and was Speaker thereof in 1848–51. His political probity and experience had made him one of the most respected men in Canadian public life and after La Fontaine's retirement he became the leader of the French-Canadian Liberals. As he agreed with the programme of the Upper Canada Liberals he joined with Mr. (afterward Sir Francis) Hincks (q.v.) in forming the Hincks-Morin administration, Morin being Provincial Secretary for Lower Canada and head of the cabinet ministers from that province. Later he held the portfolio of Crownlands. In 1854 the ministry was defeated by reason of the delay in settling the questions of clergy reserves and seigniorial tenure (see Canada, *History*) and also by the vigorous opposition of a section of the Upper Canada Liberals (Reformers) under the leadership of George Brown. Morin resigned, but as his influence in Lower Canada was still strong, he afterward joined Sir Allan MacNab in forming the MacNab-Morin administration, a coalition of Liberals and Conservatives formed to carry through the delayed measures, a purpose that was attained. In 1855 Morin was made a judge of the Superior Court of Quebec, which office he retained until a short time before his death. In 1859 he was appointed a commissioner for codifying the laws of Lower Canada. Consult J. C. Dent, *The Last Forty Years* (2 vols., Toronto, 1881), and Sir F. Hincks, *Reminiscences* (Montreal, 1884).

MORIN, mō-rĕn′, Enrico Constantino (1841–1910). An Italian naval officer and statesman, born in Genoa. He became vice admiral (1893). In 1886 he was elected to the Chamber of Deputies, from 1888 to 1891 was Undersecretary of State in the Ministry of Marine, and from 1893 to 1896 was Minister of Marine. In 1900 he became Senator and again Minister of Marine. In April, 1903, he assumed charge also of the Ministry of Foreign Affairs, but retired with the rest of the Zanardelli cabinet in November of the same year.

MORIN, mō′răN′, Jean, or Johannes Morinus (1591–1659). A French Catholic theologian and Orientalist, born at Blois of Protestant parents. He was educated at Leyden and at Paris, where he was converted to the Catholic church. In 1618 he joined the Oratorians. He was head of the College of Angers, and in 1640 was summoned to Rome by Urban VIII to assist in discussing the union of the Greek and Roman churches. He was suddenly recalled by Richelieu, who possibly feared that Morin would speak ill of him at Rome. Besides his works on Church history, and more important, Morin wrote on textual criticism: *Exercitationes Biblicæ de Hebræi Græcique Textus Sinceritate* (vol. i, Paris, 1633; vols. i, ii, ib., 1669), a work that proved to be of epoch-making significance, urging the priority and superiority of the Samaritan Pentateuch and the Greek version; *Opuscula Hebræo-Samaritica* (1657), with grammar and lexicon; and in the Paris polyglot, the first edition of the Samaritan Pentateuch and Targum. Consult E. Ruyters, "Jean Morin" in *Annuaire de l'université catholique de Louvain* (Louvain, 1910).

MO'RINE, Alfred Bishop (1857–). A Canadian journalist and statesman. He was born at Port Medway, Nova Scotia, and was educated at Dalhousie University. After a few years' experience as the Ottawa correspondent for Nova Scotia and New Brunswick newspapers he went to Newfoundland and edited the St. John's *Mercury* (1883–85) and *Herald* (1889–91). He was an Independent member for Bonavista in the Newfoundland Assembly in 1886–1906. During that period he had an important share in presenting the views of Newfoundland to the British government respecting the French rights on the west shore of the island. For this purpose he was a delegate to England in 1891, and in 1898 successfully represented the Newfoundland administration in London in the attempt to have British commissioners inquire and report upon French rights in the island. The negotiations thus set on foot resulted in the treaty between Britain and France in 1904, by which the difficulties which had existed in regard to Newfoundland since the Treaty of Utrecht (1713) were amicably settled. Morine was Colonial Secretary of Newfoundland in 1894, Receiver-General in 1897, and later Minister of Marine and Fisheries. In 1906 he removed to Toronto. In 1911 he was appointed chairman of the royal commission to investigate the Canadian civil service. He published *The Mining Law of Canada* and *Canadian Notes to Russell on Crimes.*

MORIOKA, mō′rē-ō′kȧ. The capital of the Prefecture of Iwate, Japan, situated in a mountainous district in the northern part of Hondo, about 40 miles from the coast (Map: Japan, G 4). It is celebrated for its kettles, silk goods, fruits, and vegetables. Pop., 1898, 32,989; 1903, 31,861; 1908, 36,012.

MORIORI, mō′rē-ō′rē. The aborigines of the Chatham Islands, linguistically and somatically close kinsmen of the Maori (q.v.). Their crania are distinctly more Polynesian than Melanesian, and some authorities see traces of race mixture in certain osteological peculiarities. Some anthropologists regard the Moriori as only a branch of the Maori, who reached the Chatham Islands before tattooing had come into general use or the carving and ornamentation of the New

Zealand Maori had taken on their characteristic development. Tradition, supported by other indications, suggests two migrations to these islands, one before and the other after Maori art had become matured. The flat stone clubs of the Chatham Islanders are supposed to go back to the dark people who preceded them. The best stone axes of the Moriori exceed in fineness of polish those of the Maori. The general conclusion is that the culture of the Chatham Islanders is an outspur of that of New Zealand. Such marked peculiarities as exist are due to the poverty and limitations of the group. The influence of the antecedent "dark race" is more marked there than in New Zealand itself. In 1831 they are said to have numbered 1200 to 1500; but the inroads of Maori from the Taranaki district of New Zealand in 1832–35 led almost to their extermination and there were but 200 left in 1868. The Moriori were large, powerful men, darker in color than the New Zealanders, and distinguished by broader and more hooked noses and almond-shaped eyes. In 1911 the islands were reported to contain but one pure-blooded Moriori, 218 Maori, and 234 Europeans. Consult E. Tregear, *The Maori Race* (Wanganui, 1904).

MORISCOS, mō-rē'skōs (Sp., Moorish men). The name given in Spain after 1492 to those Moors who through intimidation or force were brought over to Christianity. See MOORS; SPAIN.

MOR'ISON, JAMES (1816–93). A Scottish clergyman. He was born at Bathgate, Linlithgowshire, was educated at Edinburgh, and in 1839 was licensed by the United Secession Church. Two years later, however, he was deposed for preaching "universal atonement." With three other ministers of like beliefs, and their followers, Morison founded (1843) the Evangelical Union (q.v.). At the same time he established a theological academy, of which he continued principal until his death. He also served as minister at Kilmarnock, and from 1853 to 1884 in Glasgow, where he died. Consult his *Life* by A. Adamson (London, 1898).

MOR'ISON, JAMES AUGUSTUS COTTER (1832–88). An English author, born in London. His childhood was spent in Paris (1834–40) and he gained an intimate knowledge of French. An Oxford graduate (1859), he wrote frequently for the *Saturday Review*, and in 1863 brought out a *Life of St. Bernard*, followed by sketches of *Gibbon* (1878), *Macaulay* (1882), and *Madame de Maintenon* (1885), while his last work, *The Service of Man: An Essay towards the Religion of the Future* (1887; 5th ed., 1892), was the outcome of his Positivist beliefs.

MORISON, ROBERT (1620–83). A British botanist, born at Aberdeen. He graduated at the university of his native city in 1638, but the next year, having espoused and fought for the Royalist cause, he was compelled to flee to France. There he studied anatomy, zoölogy, botany, mineralogy, and chemistry, and in 1648 graduated in medicine at Angers. A year or two later Gaston, Duke of Orléans, appointed him one of his physicians, a position which he held until the Duke's death in 1660, and in which he made such a reputation that after the Restoration Charles II appointed him his senior physician, King's botanist, and superintendent of all the royal gardens. In 1669 he became professor of botany at Oxford. His great service to botany was in reviving the study of systematic botany upon an extensive scale, a study which had lapsed since the days of Cesalpino and Bauhin. Among his works are: *Præludia Botanica* (1669); *Plantarum Umbelliferarum Distributio Nova* (1672); *Plantarum Historiæ Universalis Oxoniensis, Pars Secunda* (1680). Consult: Pulteney, *Sketches of the Progress of Botany* (London, 1790); Tournefort, *Eléments de botanique* (Lyons, 1797; in Latin, Paris, 1700); Franchet, *Flore de Loire-et-Cher;* Sachs, *History of Botany* (Oxford, 1906).

MORITZ, mō'rīts, KARL PHILIPP (1756–93). A German author, prominent in the Sturm-und-Drang period. He was born at Hameln, of poor parents. He taught for a short time at Dessau (1777), then at a military orphanage at Potsdam (1778), and soon after in Berlin. In 1786 he went to Italy, and in Rome became acquainted with Goethe, who recommended him to Duke Karl August, by whose influence Moritz was elected to the Berlin Academy, and in 1789 became professor of antiquities in the Academy of Art in Berlin. His adventurous life can to a great degree be reconstructed from the semi-biographical novels, *Anton Reiser* (1785–90) and *Andreas Hartknopf* (1786). He wrote, besides: *Versuch einer deutschen Prosodie* (1786); *Ueber die bildende Nachahmung des Schönen* (1788); *Götterlehre* (1791); *Reisen eines Deutschen in England* (1783); *Reisen eines Deutschen in Italien* (1792–93). Consult: Dessoir, *Moritz als Aesthetiker* (Berlin, 1889); Hans Glogau, *Anton Reiser* (Marburg, 1903); Hugo Eibisch, *Anton Reisers kritische Autobiographie* (Leipzig, 1909).

MORLAIX, môr'lâ'. A seaport in the Department of Finistère, France, on the estuary of the Dossen, 4 miles from the sea and 33 miles east-northeast of Brest (Map: France, N., B 4). The estuary is spanned by a fine railway viaduct 934 feet long and 190 feet high. The town has a mediæval aspect, with its sixteenth-century church of St. Mélaine, narrow winding streets, and quaintly gabled timbered houses. The port is accessible to ships of 400 tons' burden. A considerable coastwise trade is carried on in leather, paper, grain, and horses. The industrial establishments include paper mills, an important government tobacco factory, and manufactures of candles, kegs, and wooden shoes. Pop., 1901, 16,086; 1911, 15,262. Morlaix dates from the Roman occupation. In 1187 it was besieged and captured by Henry II of England. In 1522 it was taken by the troops of Henry VIII of England, but recaptured by the French in a night attack, when 600 Englishmen were killed.

MOR'LAKS. A Slavonic people belonging to the southern branch and living along the coast of Dalmatia, Austria-Hungary. They settled in this locality during the great southern migration of the Serbs from the Carpathian region in the sixth and seventh centuries. They are a hardy, seafaring people, who furnish the best material for the Austrian navy, and are prominent in the commerce of the Adriatic. They are generally classed with the Dalmatians. See DALMATIA.

MOR'LAND, GEORGE (1763–1804). An English genre, animal, and landscape painter. He was born in London, the son of Henry Morland (c.1730–97), painter, engraver, and picture dealer, from whom he inherited his talent and received his artistic training. At the age of 10 he exhibited sketches at the Royal Academy, and at 17 he had attained a reputation

as a copyist, especially of the Dutch and Flemish masters, at the same time producing original compositions, such as the "Angler's Repast." After a rupture with his father he set up on his own account in 1784 or 1785 and dashed into a career of dissipation and prodigality, supporting himself by the sale of his pictures, painted with marvelous rapidity and cleverness. He lived with a picture dealer and became the companion of hostlers, potboys, jockeys, pawnbrokers, and similar worthies. In 1786, after his return from a short visit to France, he married the sister of the engraver William Ward, and for a time reformed. At this period he painted moralities in the style of Hogarth, notably the "Lætitia" series; but he soon returned to his profligate life and in 1791 produced his masterpiece, the "Interior of a Stable," now in the National Gallery, London. He became popular and dealers flocked to him. Sometimes he painted two pictures a day, and once a large landscape with six figures in six hours. Every demand for money, tavern score, or bill was paid by a picture worth many times the charge. His subjects were scenes in humble life in town and country—cottages, stables, inn yards, pastoral scenes, and domestic animals, especially pigs. In this last-named subject no painter has equaled him, as witness the examples in the galleries of the New York Public Library and of Budapest. Altogether he painted 4000 pictures, 250 of which were engraved. He was imprisoned for debt from 1799 to 1802 and died in a sponging house in Holborn, Oct. 27, 1804. His epitaph on himself was, "Here lies a drunken dog." He was generous, good-natured, and industrious despite his faults.

After a period of neglect Morland is now ranked among the best masters of genre and animals, rivaling in his best work the Dutch artists on whom he modeled his style. He was a very facile brushman; his composition is remarkably good, his color is rich and harmonious, and his treatment, if light, is delicate and skillful. His presentation is realistic and truthful. The National Gallery possesses altogether eight paintings by Morland, including, besides the "Interior of a Stable," "Cowherd and Milkmaid," "The Fortune Teller," and "Roadside Inn"; in the South Kensington Museum are ten, the best known being "The Reckoning." The Museum of Glasgow has a "River Scene" and three seacoast landscapes. In the New York Historical Society are his "Old English Sportsman" and "Dogs Fighting"; in the New York Public Library, "Midday Meal"; and in the Corcoran Gallery, Washington, "The Farmhouse." The Louvre possesses "The Halt." His self-portrait is in the National Portrait Gallery, London.

Bibliography. William Collins, *Memoirs of a Picture* (London, 1803); Blagden and Hassell, *Memoirs of George Morland* (ib., 1806); and the monographs by Ralph Richardson (ib., 1895) and J. T. Nettleship (ib., 1898); also G. C. Williamson, *George Morland* (ib., 1904); D. H. Wilson, *George Morland* (New York, 1907); Gilbey and Cuming, *George Morland* (ib., 1907).

MORLAND, Sir Samuel (1625–95). An English diplomat, mathematician, and inventor. He was born in Sulhampstead, Berkshire, and studied at Winchester School and at Magdalene College, Cambridge. His first political affiliations were with the Parliamentary party. Morland's first mission of importance was to the Duke of Savoy in 1655 to protest against the massacre of the Waldensians. In this he was successful. Morland brought back with him materials, mostly clumsy forgeries, for a history of this sect, which he published in 1658. His discovery of a political plot in which Cromwell and some of his chief supporters were alleged to be concerned alienated his sympathies from the Parliamentary party and he afterward favored the restoration of Charles II. After the Restoration in 1660 Morland received the title of Baronet and many promises from the King which were only partly fulfilled. He devoted himself more and more to the study of mathematics and mechanics and invented a speaking trumpet, a capstan, and some calculating machines. The King furnished money to aid him in his experiments. Towards the close of his life Morland devoted himself specially to experiments in hydrostatics and hydraulics. He invented and improved pumps and water engines, notably the plunger pump, and improved the fire engine then in use. Familiar with the power of steam, as well as its other properties, he undoubtedly proved that it could be usefully employed. In some ways he anticipated the discoveries of James Watt (q.v.). He received medals for his researches and inventions, and published several scientific works. In one of the latter is a virtual description of the steam engine, the date, 1682, being considered by some authorities as that of the invention of this engine, though it was not patented by Savery (q.v.) until 1698.

MOR'LEY. A municipal borough in the West Riding of Yorkshire, England, 4 miles south-southwest of Leeds. The new town hall is a handsome building, opened in 1895, and the municipality owns its water works, gas and electric-lighting plants, maintains public baths, parks, and recreation grounds. It has important manufactures of woolens and mill machinery. There are coal mines and stone quarries. Morley is mentioned in *Domesday*. It was incorporated in 1885. Pop., 1901, 23,636; 1911, 24,282. Consult Smith, *Morley, Ancient and Modern* (London, 1886).

MORLEY, Baron. See Monteagle, Baron.

MORLEY, Edward Williams (1838–). An American chemist, born at Newark, N. J. He graduated from Williams College in 1860 and from 1869 to his retirement in 1906 was professor of chemistry at Adelbert College, Western Reserve University. With this post he also held (1873–88) a chair of chemistry at the Cleveland Medical College. He was associated with A. A. Michelson (q.v.) in researches on the relative motion of ether and matter and also in the determination of the meter in terms of the wave length of light. His determination of the ratio of the atomic weights of oxygen and hydrogen was a classic contribution to scientific knowledge. He was president of the American Association for the Advancement of Science (1895) and of the American Chemical Society (1899); became a member of the National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences; in 1912 he was honorary president of the eighth International Congress of Applied Chemistry; and received honorary degrees from various institutions, including Williams, Lafayette, Yale, and Pittsburgh.

MORLEY, FRANK (1860–). An American mathematician. He was born at Woodbridge, Suffolk, England, and graduated M.A. from King's College, Cambridge, in 1886. He served as master of Bath College in 1884–87, and then, coming to the United States, he taught mathematics at Haverford College, Pa., from 1887 to 1900, when he became professor of mathematics at Johns Hopkins University. He became editor of the *American Journal of Mathematics.* His publications include *Elementary Treatise on the Theory of Functions,* (1893), with James Harkness; and *Introduction to the Theory of Analytic Functions* (1898).

MORLEY, HENRY (1822–94). An English author, born in London, Sept. 15, 1822. He was educated at a Moravian school at Neuwied on the Rhine and at King's College, London (1838–43); practiced medicine at Madeley in Shropshire (1844–48); and, having been fleeced by a colleague, he started a school on Moravian methods at Manchester, but after two years he started it afresh at Liverpool. A series of ironical essays entitled *How to Make Home Unhealthy* attracted the attention of Dickens and eventually led to Morley's settling in London and taking a hand in *Household Words* and *All the Year Round* (1850–65). He also became connected with the *Examiner* as subeditor and then as editor (1856–64). Meanwhile he was appointed lecturer in English at King's College (1857–65) and then professor of English at University College, London (1865–89). He died May 14, 1894. Chief among Morley's works are: *A Defense of Ignorance* (1851), a bit of irony; *Lives* of Palissy the Potter (1852), Jerome Cardan (1854), Cornelius Agrippa (1856), and Clement Marot (1870); *Memoirs of Bartholomew Fair* (1857); two volumes of fairy tales (1859–60); *English Writers,* to Dunbar (1864–67), rewritten and brought down to the seventeenth century (11 vols., 1887–95); *A First Sketch of English Literature* (1873; revised, 1886); *English Literature in the Reign of Victoria* (1881). His editorial work includes the *Library of English Literature* (5 vols., 1875–81); *Universal Library* (63 vols., 1883–88); *Cassell's National Library* (214 vols., 1886–90); the *Carisbrooke Library,* a series of reprints (14 vols., 1889–91); *Companion Poets* (9 vols., 1891–92). Though Morley was not a critic and editor of the first rank, he had scholarship, catholic tastes, and a talent for finding the best in things, and he performed a most valuable service in making easily accessible the treasures of English literature.

MORLEY, JOHN. See MORLEY OF BLACKBURN.

MORLEY, MRS. The name adopted by Queen Anne in her correspondence with the Duchess of Marlborough. See FREEMAN, MRS.

MORLEY, SAMUEL (1809–86). An English politician and hosiery manufacturer, born at Homerton (now part of London). He became manager in 1840 and sole owner in 1855 of his father's hosiery warehouse in London, and in 1860 he took over the Nottingham hosiery business established by his father and uncle. He erected several modern knitting mills and accumulated a great fortune. His home at Stamford Hill became a frequent meeting place of radical politicians and of dissenting ministers. He was a Liberal member of Parliament for Nottingham in 1865–66 and for Bristol in 1868–85, giving his enthusiastic support to Gladstone, who offered him a peerage in 1885. He became one of the proprietors of the chief Liberal newspaper, the London *Daily News,* whose price he caused to be reduced to a penny.

MORLEY, THOMAS (1557–1603). An English musician and composer. The place of his birth cannot be definitely fixed, but it is supposed that he was born in London and educated at St. Paul's Cathedral. According to his own statement he also studied under Bird. In 1588 he became bachelor of music at Oxford and in 1591 was deputy chorister at St. Paul's, taking his regular turn of duty as organist. In 1592 he was made epistler of the Chapel Royal. He strove hard during his entire career for the advancement of English music, and devoted himself exclusively to the development of vocal music. His principal work and that upon which his reputation is chiefly based was *A Plaine and Easie Introduction to Practicall Musicke,* published in 1597. It was the first practical work on music issued in England; was translated into German and published throughout the German states by Trost of Halberstadt about 1660. In England it remained an authority up to so late a period as 1770. He wrote many compositions for the Church, none of them, however, being printed in his lifetime. Tallis's monopoly of music printing expired in 1596, and two years later Morley obtained a similar one, and under his license "William Barley, Thomas Est, alias Snodham, Peter Short, John Windet, and others" printed several books as the "assigne of Thomas Morley." He resigned from the Chapel Royal in 1602. That he was an excellent musician his ballets and madrigals prove. He was also superior in melodic invention to any of his predecessors.

MORLEY OF BLACKBURN, JOHN, first VISCOUNT (1838–). An English statesman and author, born at Blackburn, Lancashire, Dec. 24, 1838. Having taken his degree at Lincoln College, Oxford (1859), he went to London to devote himself to literature. He soon became editor of the *Literary Gazette,* at that time in such a state of decrepitude that Morley, with all his energy and talent, could not quicken it to new life. Morley's writings early showed the influence of Auguste Comte, and he became known as an agnostic philosopher. From 1868 to 1870 he edited for a short period the daily *Morning Star.* In 1867 he succeeded Lewes as editor of the *Fortnightly Review,* which he conducted brilliantly till 1883, becoming, in that year, editor of *Macmillan's Magazine.* In 1873 he was called to the bar at Lincoln's Inn. Under his guidance the Macmillans issued after 1878 the "English Men of Letters Series," to which Morley contributed a short but excellent *Life of Edmund Burke* (1879). His *Burke,* an historical study, had appeared in 1867. In 1880 he began ably to edit the *Pall Mall Gazette;* in 1881 published his *Life of Cobden;* and in 1883, after two failures, was at a by-election returned to Parliament for Newcastle-upon-Tyne. He soon became prominent, and in 1886 was Chief Secretary for Ireland under Gladstone, thus getting an insight into Gladstonian politics and character to be shown later in his monumental *Life of Gladstone* (1903). Morley sympathized with the Irish Nationalists, but, unlike Gladstone, he was unhampered by pledges and opinions. After the defeat of the Liberals in 1886 he was half in politics, half in

letters, till Gladstone's return to power restored him to his secretaryship (1892–95). Morley's anti-imperialistic views helped to lose him his seat in 1895, but he was elected from the Montrose Burghs in February, 1896, and this constituency he continued to represent until his elevation to the peerage in 1908. In 1898 and afterward he upheld the Boers. From 1905 to 1910 he was Secretary of State for India and then for four years Lord President of the Council. He resigned from the cabinet in August, 1914, because, with convictions opposed to war, he desired no part in the responsibility for British action against Germany after the invasion of Belgium. Numerous honors came to Morley—the Order of Merit, the chancellorship of Victoria University, degrees from Oxford, Cambridge, Edinburgh, Glasgow, and St. Andrews, etc. The rich historical library of Lord Acton, which Andrew Carnegie presented in 1902 to Morley, the latter gave, a few months afterward, to Cambridge. His place as a leading English writer and a philosophical radical with the full and frank courage of his convictions was firmly established by the works above mentioned and also by his *Critical Miscellanies* (two series, 1871 and 1877); *Voltaire* (1871); *Rousseau* (1873); *The Struggle for National Education* (1873); *On Compromise* (1874); *Diderot and the Encyclopædists* (1878); *Walpole* (1889); *Studies in Literature* (1891); *Cromwell* (1900); *Literary Essays* (1906); *Notes on Politics* (1914).

MOR'MOLUCOI'DES (Neo-Lat. nom. pl., from *mormoluca*, glowworm, from Gk. μορμολύκειον, *mormolykeion*, μορμολύκιον, *mormolykion*, hobgoblin, from μορμολύττεσθαι, *mormolyttesthai*, to frighten, from μορμώ, *mormō*, bugbear + εἶδος, *eidos*, form). The oldest known fossil insect larva, found in the shale of the Newark formation of the Jura-Triassic system in New Jersey, Connecticut, and Massachusetts. In general appearance it resembles the larva of the modern firefly, though it is considerably larger, being quite three-quarters of an inch in length. It is considered to be the young of a neuropteran insect allied to the modern dobsons (Sialidæ).

MOR'MON, Book of. A book issued at Palmyra, N. Y., 1829, by Joseph Smith, Jr., who professed to have been led to its discovery by an angel. He claimed it was written on gold plates in reformed Egyptian characters, and accompanied by the Urim and Thummim by means of which he translated it. It purports to be the sacred writings of a series of prophets and a sacred history of two nations occupying this continent from the time of the Tower of Babel till about four hundred years after Christ. It is considered equally sacred with the Bible by Latter-Day Saints. See Mormons.

MORMON CRICKET. Either of the wingless migratory crickets, *Anabrus simplex* and *Anabrus purpurescens*. These are large, peculiarly shaped crickets, which occasionally multiply so greatly in their native home in the foothills of the Rocky Mountains that they migrate to the plains below and destroy all cultivated crops. As they are wingless, they move but slowly, and may often be checked by ditches. A plowed field in their course forms a difficult barrier, and an approaching army may be destroyed by means of heavy rollers. They are pugnacious and will fight among themselves, and are to a certain extent carnivorous, devouring their injured comrades. For many years they have been especially abundant and injurious in portions of Montana and Idaho.

MORMONS, or more properly The Church of Jesus Christ of Latter-Day Saints. A religious sect which originated in the United States. Its early history is that of its founder, Joseph Smith, Jr., who was born in the town of Sharon, Windsor Co., Vt., Dec. 23, 1805. His father engaged in several occupations, including those of farmer and well digger. Some writers assert that he was a "water witch," i.e., had the ability to locate with a forked wand hidden streams of water. Belief in this form of divination was then common, and still persists in some localities. Joseph's mother displayed great interest in religious matters, and it is said that she early announced the coming of a prophet in her own family. In 1816 the Smiths migrated to the semiwilderness of western New York and after a short residence in the village of Palmyra, Wayne County, settled upon a piece of land 6 miles south of that place on the border of Manchester, Ontario County. There they seem to have led a hand-to-mouth existence. Their neighbors were poor, plain, but generally religious folk of the frontier type.

It appears that Joseph Smith, Jr., had no special preparation for the calling of prophet. He received little education, but was taught to read, write, and cipher. He himself later testified that he was "a rough stone" and desired "the learning of heaven alone." From time to time he journeyed into Pennsylvania, where in 1827 he became engaged to the daughter of a respectable farmer and married her.

According to his own account, Smith had already begun to have visions. The first of these occurred in the spring of 1820 when the boy prophet was only 14 years old. It was a time of great religious excitement, and Joseph, with others of the Smith family, was more or less affected by revival meetings. His attention was attracted strongly to the text, "If any of you lack wisdom, let him ask of God, that giveth to all men liberally, and upbraideth not, and it shall be given him" (Jas. i. 5). He determined to ask of God "which of all the sects was right—and which I should join." He retired to a place in the woods, knelt in fervent prayer, and presently beheld "a pillar of light exactly over my head, above the brightness of the sun, which descended gradually until it fell upon me. . . . When the light rested upon me I saw two personages, whose brightness and glory defy all description, standing above me in the air. One of them spake unto me, calling me by name, and said, pointing to the other, 'This is my Beloved Son. Hear Him!'" When Joseph got sufficient command of himself, he asked concerning the various sects and was told that all were wrong, that he must join none, for all their creeds were an abomination in His sight.

Book of Mormon. One night three and a half years later (Sept. 21, 1823) Joseph experienced a second vision. An angel named Moroni thrice appeared to him and revealed the hiding place of certain golden plates containing the history of the ancient peoples of America. Next day Moroni again appeared to Smith; and the boy made a journey to the hill Cumorah, near Manchester, where he found the wondrous plates, but was not permitted by the angel to carry them away. On each twenty-second of September for three years thereafter Smith visited the hill and saw the plates, but was each time informed

by Moroni that the time was not ripe for their removal. On Sept. 22, 1827, however, some months after Smith's marriage, the custodian angel delivered the records into Smith's keeping with permission to reveal what was not "sealed." The message was written in a strange language upon golden plates, bound in a volume and closed with three clasps.

The years 1828–29 were devoted mainly to the translation of the graven characters on the golden plates. According to Smith, he used in this work two transparent crystals, set in rims of silver and fastened to a breastplate, constituting the Urim and Thummim of the ancient Hebrews. Smith was aided in the work by his wife, Emma Hale Smith, and by Martin Harris and Oliver Cowdery. Cowdery was a schoolmaster, and Harris was a farmer, who had been, in turn, Quaker, Universalist, Baptist, and Presbyterian. Harris's wife temporarily interrupted the work by destroying a portion of the manuscript, but the task was at last completed, and the book was published at Palmyra early in 1830. The necessary money was obtained by Harris's mortgaging his farm. The title given the work was *Book of Mormon.* The price was fixed at $1.25 a volume, and Joseph Smith, Sr., for a time went about the country selling it. The golden plates were safely kept till the day the heavenly messenger called for them, when they were delivered into his hands.

The *Book of Mormon* purports to unfold in biblical language the history of ancient America from about the time of the dispersion from the Tower of Babel to the beginning of the fifth century of the Christian era. The first inhabitants were called Jaredites and came directly from Babel. The second race were principally Israelites and came from Jerusalem about 600 B.C. and supplanted the Jaredites. The Saviour made his appearance after his resurrection and gave the gospel to these people. Generations later the Nephites, the principal nation of the second race, were cut off on account of their wickedness; the remnant are the Indians who now inhabit the country. Mormon, a prophet and the last of the Nephite leaders, having written an abridgment of the history, prophecies, and revelations of these various peoples, the abridgment, as completed by his son Moroni, was hidden in the earth, whence it should come forth in the last days and be united with the Bible and thus accomplish the purpose of God. The last days were here, and the prophet had been found in the person of Joseph Smith.

Various theories have been advanced by Gentile writers in attempting to explain the genesis of the *Book of Mormon.* Some writers have conjectured that Sidney Rigdon, an eccentric Disciple minister, was the real deus ex machina and that perhaps he took as a basis a manuscript historical romance written some years before by one Solomon Spaulding, a graduate of Dartmouth, who had been, in turn, preacher, teacher, iron founder, and amateur archæologist. These skeptics assume that Smith could hardly read or write, and think it probable that Rigdon furnished him a manuscript from which Smith read while pretending, behind a screen, to decipher the "reformed Egyptian" hieroglyphics of the Golden Book by the aid of the Urim and Thummim. But no evidence has ever been found that Smith and Rigdon had ever met or had communication prior to the publication of the *Book of Mormon.* The recovery in 1885 of the alleged original of Spaulding's manuscript in Hawaii (now in the library at Oberlin College) has been to Mormons, however, conclusive proof of its nonconnection with their sacred book, for there is no real resemblance between the two.

Critics of the *Book of Mormon* itself declare that, in addition to private affairs inadvertently incorporated, they detect, in scriptural paraphrase, descriptions of the current agitations against Romanism, Freemasonry, infidelity, and even references to the so-called Washingtonian movement for total abstinence. The then widely prevalent theory that the Indians were the lost ten tribes of Israel is also embodied. The Nephites were not merely the modern Indians in disguise, but in their mental habits they are said to resemble local sectarians.

Organization of the Church. According to the Mormon narrative, while Smith and Cowdery were still engaged in the work of translating the *Book of Mormon,* a heavenly visitant, who was none other than John the Baptist, appeared (May 15, 1829) to them and conferred upon them the priesthood after the order of Aaron; and less than a year later the Apostles Peter, James, and John appeared and conferred upon Joseph and Oliver the priesthood after the order of Melchizedek. Thus empowered Smith and Cowdery presently began to preach and baptize. Six members were required by the laws of New York to effect a legal organization. The two elders associated with themselves Hyrum Smith, Samuel H. Smith, Peter Whitmer, Jr., and David Whitmer, and, April 6, 1830, organized at Fayette, N. Y., the religious body that was subsequently (1834) called the Church of Jesus Christ of Latter-Day Saints. (See also Reorganized Church of Jesus Christ of Latter-Day Saints.) Several other persons had been baptized, but only these six were included in the original organization. "Thus was founded," writes the church historian, Orson F. Whitney, "the Church of Jesus Christ of Latter-Day Saints. Thus arose, as a system, what the world terms Mormonism—universally regarded as the most remarkable religious movement of modern times; detested and denounced throughout Christendom as a dangerous and soul-destroying imposture, but revered and defended by its disciples as the wonderful work of the Almighty, the veritable 'marvelous work and a wonder,' foretold by Isaiah and other ancient seers, which was to prepare the world, by the preaching of the restored gospel and the founding of the Latter-Day Zion, for the Messiah's second coming and the advent of the millennium."

The times were favorable for the new church. The land was still filled with doctrinal disputes; denomination set itself against denomination and creed made war on creed. Belief in ghosts and witches still lingered; there was much talk of signs and seasons, God's ways and Satan's ways; stories of visions and miracles were accepted with credulity; the second advent and the millennium were confidently expected by many. In 1831 the fanatic William Miller unlocked the prophetical numbers and with illustrative charts on which were depicted Nebuchadnezzar's image and apocalyptic beasts proclaimed to a doomed world that at some time between March 21, 1843, and March 21, 1844, Christ would appear and summon all on earth to judgment. In 1832 John Jay Shiperd and Philo Penfield Stewart founded the Oberlin colony in

northern Ohio to serve God and to hold property only in His interests. Jemima Wilkinson prophesied at Crooked Lake; the Fox Sisters started spiritualism only 10 miles from Joseph Smith's house; the return of apostolic gifts, of apostolic church organization, of divine recognition, was fervently hoped for by the local Quakers, Primitive Baptists, and Restorationists. It was an American era of revivals, of mental feverishness, of discontent with the hard realities of social existence, of readiness to embrace new ideals and new experiments.

Kirtland-Missouri Period. The Mormon faith soon won converts. Missionaries were sent to neighboring States and to Indian tribes. Locally, however, the new faith aroused little but hostility and derision; but, early in 1831, in obedience to a "revelation," the church removed to Kirtland, Ohio, where Sidney Rigdon had already gathered a communistic congregation. These people proved athirst for the new religion and adopted it with avidity. Converts came from all directions, and the church soon numbered nearly 2000 members. Kirtland soon presented the appearance of a modern Mecca. The prophet, with Sidney Rigdon and others, continued preaching the gospel in the face of all kinds of difficulties. In spite of numerous apostasies, especially in 1836, the faith still spread and revelation followed revelation. In 1833 the presidency of the church, consisting of Joseph Smith, Jr., Sidney Rigdon, and Frederick G. Williams, was organized, and in 1835 the apostolate of 12 was established. In 1837 the first foreign missionaries were sent to England. A temple costing about $40,000 was built at Kirtland, and the people prided themselves in building up a clean and wholesome civic and economic community.

But Kirtland was to be a "stake" only. By revelation it was decided at some time to build a temple at Independence, Jackson Co., Mo., and the place was blessed to this end. But Missourians disliked the religious teachings of the Saints; moreover, they were rendered suspicious by their antislavery notions and by the printing of the *Book of Commandments,* in which Missouri was called "the land of your inheritance, which is now the land of your enemies." "The Mormons must go!" became the general cry. Late in 1833 the Saints were forcibly driven from their Zion and took refuge in Clay, Lafayette, and Van Buren counties. But there, also, they suffered new persecutions, and finally petitioned the State Legislature to assign them a place of residence. The thinly settled region that became Caldwell County was designated, and there the Saints founded the town of Far West. Meanwhile affairs at Kirtland had gone badly. The financial panic of 1837 involved some of the leaders in legal difficulties. Rebellion broke out and, early in 1838, Smith and Rigdon fled to Far West, where, in July, the corner stone of a new temple was laid. Here the tithing system was adopted. New troubles soon arose, however. Gentile mobs attacked the faithful, and the faithful retaliated in kind. The militia were called out. Governor Boggs, long a Mormon hater, issued an order that the "Mormons must be treated as enemies, and must be exterminated or driven from the State, if necessary for the public peace." Throwing law to the winds, the Missourians fell upon the Mormons and forced them (1838) to leave the State. Smith, Rigdon, and other leaders were arrested on a charge of treason and other offenses, but some months later managed to escape. The Mormons vainly appealed to Congress to redress their wrongs.

Nauvoo Period. Upon the rich eastern bank of the Mississippi, in Hancock Co., Ill., a few miles above Warsaw, the oft-harried Saints pitched their tents and solemnly consecrated a place of residence. Here, as by magic, arose Nauvoo, the "Place Beautiful." Saw mills, flour mills, factories, and foundries were soon in busy operation, and for the fourth time a temple was begun. The city grew apace. By 1840, when the Harrison campaign was in full tide, Smith had too many votes at his disposal to be ignored, and Abraham Lincoln, one of the Whig electors, thought it worth his while to see that the prophet and his people had the right kind of political literature. The Saints threw their votes to the Whigs, though, to show their power and keep the Democrats in good humor, they scratched the last name on the Whig electoral ticket and substituted that of a Democrat. The Whig Legislature recognized the substantial aid thus rendered by granting to Nauvoo a charter that clothed the council with almost unlimited power. The bidding for the political support of the Saints was so keen that not a single vote was recorded against the grant of the charter, Stephen A. Douglas lending his dexterous management of the Democratic members. The mayor was both executive and judiciary. Hancock County and its perquisites were ignored, and the Nauvoo Legion was organized and officered, a military force subject to no State authority but the Governor.

It was at Nauvoo, according to the Utah church, that by revelation the institution of polygamy was revived. The *Book of Mormon* had declared, "Behold, David and Solomon truly had many wives and concubines, which thing was abominable before me, saith the Lord," and had forbidden the faithful to have more than one wife. At Kirtland and in Missouri some of the Saints had tried to take a liberal view of the marriage relation, but such tendencies were restrained by the church authorities. At Nauvoo, however, Joseph Smith had a "revelation" (July 12, 1843) in favor of the practice of polygamy, and he and other leaders practiced the doctrine of "celestial marriage" and largely increased their households. Aware, however, that the announcement of such a doctrine to the world would cause a great uproar, the leaders of the church endeavored to keep it secret, and it was not formally promulgated until 1852, when the Mormons were safely ensconced in their desert stronghold beyond the Rockies. Polygamy was not merely permissible, but was urged upon those able to support more than one wife. It was a part of the doctrine that no woman can enter heaven unless sealed "for time and eternity" to some devout member of the Mormon church, and that space is filled with spirits seeking some "tabernacle of clay" by means of which they may attain salvation. Mormons justified polygamy not only because authorized by their prophets, but because it was sanctioned by the Old Testament.

At one time during the Nauvoo period as many as seven of the twelve apostles were engaged in preaching and publishing in England, and in 1842 eight ships were chartered to transport converts to America. By this time the prophet's followers were numbered by the thousands. He

was at the height of his fame. In both secular and spiritual affairs he was looked to as a leader, and, as the culmination of his interest in civic, political, and economic questions, he announced himself (February, 1844) a candidate for the presidency of the United States. His position, however, was not without danger, and the seeds that were to result in his destruction were already germinating. In the spring of 1842 Governor Boggs was shot and wounded, and suspicion turned against Smith as the instigator of the crime. He was arrested, but was freed by the municipal court on a writ of habeas corpus, and all attempts to take him to Missouri for trial failed. John C. Bennett, whom the people had made mayor of Nauvoo and major general of the legion, withdrew from the church and began a vindictive attack upon its members. The Gentile neighbors felt that the legion menaced the peace of Illinois, and it was said that the Saints expected to conquer Missouri and ultimately the whole country. Newspapers took up the anti-Mormon movement; Democrats and Whigs, who in turn had secured the votes of the Saints, looked upon them as uncertain allies and dangerous enemies; the orthodox churches stood in solid phalanx against the new doctrine.

The plural-wife doctrine stirred up considerable opposition among the Mormons themselves, and a number of prominent members, including Dr. R. D. Foster, William and Wilson Law, and Sylvester Emmons, decided to establish a newspaper in Nauvoo to combat the new order of things. In its first and only number the *Expositor*, as the paper was called, denounced (June 7, 1844) polygamy openly, condemned Smith's political aspirations as preposterous, and demanded reforms. The paper was suppressed by Mayor Smith and the city council as a public nuisance, the press was broken up, the type was pied, and all that was combustible was burned. This act precipitated a Mormon catastrophe. The owners of the *Expositor* obtained a writ at Carthage, Ill., for the removal to that place of Smith and the Nauvoo council on a charge of riot. When the writ was presented the Nauvoo municipal court granted a writ of habeas corpus, and a Mormon justice of the peace heard the case and discharged (June 17) the accused. But public indignation ran high among the Gentiles about Nauvoo, and a movement began to drive out the Saints. Both sides took up arms. The prophet started to flee to the West, but decided to return, and with his brother Hyrum was lodged in Carthage jail on a charge of treason. About 1200 militia gathered in Carthage, while another large force assembled at Warsaw. Governor Ford, who had pledged the prophet protection, ordered the militia to disband, with the exception of three companies, two of which were to guard the jail, while the third accompanied the Governor on a trip of investigation to Nauvoo. When Ford left Carthage a mob composed of militiamen and a few Missourians easily overpowered the not unwilling prison guard of nine men and battered down the door behind which the prophet and his brother were confined with two friends, Taylor and Richards, who were voluntarily bearing them company. Hyrum Smith was instantly killed; Taylor was disabled; the prophet, seeing that the end had come, defended himself valiantly with a six-barreled pistol. After wounding three of his assailants and being severely wounded himself, he ran to the open window and leaped into the yard below. There the mob completed their bloody work.

Brigham Young and the Migration to Utah. Most of the Mormons accepted the leadership of Brigham Young. Young was a native of Whitingham, Windham Co., Vt., and at the time of the prophet's death was 43 years old. In his youth he had worked as a farmer, carpenter, painter, and glazier, and received little education. He embraced the Mormon faith in 1832 and gradually rose in authority, until, in 1839, he became president of the quorum of 12 apostles, to whom Smith is said to have given his "keys" of presidency. Young conducted the driven Saints successfully from Missouri to Illinois, and in the crisis following the prophet's death was hailed as head of the church by the people and later was sustained as president of the church according to the practice that the head of the 12 apostles should become president of the church on the death of the former president. Possessed of exuberant vitality, confident in himself and his cause, Young was gifted with great wisdom. It was well for the Saints that it was so, for their church had fallen upon perilous times. In January, 1845, the Nauvoo charter was repealed, and popular hostility continued so bitter that the Mormons agreed to leave the State the following spring. The property that could not be carried away was sold for what it would bring, or abandoned entirely; great numbers of wagons were built, tents and wagon covers made; wheelwrights, carpenters, and blacksmiths were busy day and night. Early in 1846, harried by their enemies, driven almost at the point of the sword, the Saints turned their backs upon the just completed temple, crossed the Father of Waters, and went their way westward "in pursuit of the ever-mocking phantom of home." The emigration of so many people was necessarily a slow one. The following winter found them scattered from the Mississippi to the Missouri, their main encampment being on the eastern bank of the latter river at the winter quarters now called Florence. On the way the men had hunted, had worked for the Iowa people, and at some of the camps had raised crops of corn. Naturally there was much suffering, especially from hunger and ague, but the march was well regulated, and the leaders did all in their power to keep up the spirits of their people. Dances were frequently held, and "the visiting Iowans looked on in amazement, to see these exiles from comfortable homes enjoying themselves on the open prairie, the highest dignitaries leading in Virginia reels and Copenhagen jigs." The Mexican War had begun that year, and over 500 of the Mormons volunteered and accompanied Col. Stephen W. Kearny (q.v.) to Santa Fe and California. The bounty money paid these men was mostly turned over to their brethren and proved of great assistance.

In April, 1847, a pioneer band composed of 143 men, three women, and two children set out under the leadership of Young to select a place for new homes. On June 26 they reached South Pass. On July 21 Erastus Snow and Orson Pratt, who were in advance, caught sight of Great Salt Lake and broke into loud hosannas. Next day an advance party camped on the site of the present Salt Lake City and sent back word of their discovery to Brigham Young. "We found the land so dry," says Snow, "that

to plough it was impossible, and in attempting to do so some of the ploughs were broken. We therefore had to distribute the water over the land before it could be worked." To many of the Saints the aspect of their Promised Land was discouraging, for it was a desolate, treeless plain, with sagebrush almost the only vegetation. Nevertheless, when the Mormon leader reached a point on Big Mountain whence he could survey the valley, he recognized its possibilities and said: "It is enough. This is the place."

Crops were planted, a town that was named Great Salt Lake City was laid out, a temple site was selected, and a fort was built. Members of the Mormon battalion who had followed Kearny rejoined their brethren from time to time. A party that had gone from New York by way of Cape Horn and California journeyed thither across the Sierras. The Saints who had been left behind by the pioneer expedition came to Utah in well-organized companies, and before the end of 1848 the population of the valley numbered more than 5000. At first there was much suffering from lack of food, clothing, and shelter; plagues of crickets and locusts threatened the crops; but soon there was an abundance for all. The discovery of gold in California and the wild rush across the plains that followed enabled the thrifty Saints to sell their surplus produce at high prices, while some of them grew rich as carriers of the gold seekers and their goods. Missionary work was continued abroad, and a fund was established for assisting poor converts to Utah. Some hundreds of the immigrants made the long journey from the Missouri, pulling handcarts containing their young children and worldly possessions. Many died on the way. By 1852 the population was variously estimated at from 25,000 to 30,000.

On March 10, 1849, a convention adopted a constitution for a State to be called Deseret (the honeybee). Two days later a provisional government was organized with Brigham Young as Governor. The general assembly met in July and sent a memorial to Congress asking for admission to the Union. The plea was refused, the Territory of Utah was organized instead, and Young was appointed Governor. Some feeling of ill will grew up between the non-Mormon members of the government and the Mormons. Outside of Utah opposition to Mormonism was greatly increased by Young's publication in 1852 of Smith's "revelation" on the eternity of the marriage covenant, including plurality of wives. The Republican National Convention of 1856 proclaimed it "the duty of Congress to prohibit in the Territories those twin relics of barbarism—polygamy and slavery." Soon after his inauguration President Buchanan directed the organization of a military force to march to Utah and uphold the Federal authority, and appointed Alfred Cumming of Georgia to succeed Young. In his message to Congress he declared (Dec. 8, 1857) it "sufficient to say that all the officers of the United States, with the single exception of two Indian agents, have found it necessary for their own safety to withdraw from the Territory, and there no longer remained any government in Utah but the despotism of Brigham Young." But the information on which President Buchanan based his message was found by government officials themselves to be incorrect. By many in the East it was believed the Mormon issue was brought up to take attention from the slavery question. The military expedition, led by Col. Albert Sidney Johnston (q.v.), reached the borders of Utah in the fall of 1857 and spent the winter encamped among the mountains. On September 11 occurred, about 300 miles south of Salt Lake City, the famous Mountain Meadows Massacre (q.v.), news of which was a long time in reaching the East. A conflict between the Mormons and the troops seemed probable, and the Mormons did, in fact, destroy some supply trains; but in the spring of 1858 Cumming was peaceably installed as Governor and the so-called Mormon War came to an end.

Brigham Young was never again Governor, yet such was his influence as head of the church that he usually managed to dominate the affairs of the Territory. Young died in 1877, leaving a fortune valued at about one million dollars. Some observers had prophesied that after his death Mormonism would decline, but it caused no more change "than does the death of a pope in the Church of Rome." Young's character has been variously interpreted. Mormon writers represent him as a wise and able patriarch, steadfast in adversity, who led his people out of the Valley of Despair into the Promised Land and there acted as their faithful guide and counselor. Whatever may be the differences of opinion concerning his private life or his religious beliefs, historians are united in considering him as the greatest colonizer of modern times.

Crusade against Polygamy. Agitation against polygamy resulted in the passage by Congress in 1862 of the Morrill Act, directed against the practice, but nothing practical was accomplished by this legislation. The Cullom Bill of 1869 was opposed by Delegate Hooper of Utah on the ground that the Mormon views of the marriage relation were an essential part of their religious faith and therefore secured by constitutional guarantee against infringement. In 1871 indictments were found against Young and others for lascivious cohabitation, but only an Englishman named Thomas Hawkins was convicted. The Poland Act of 1874 declared the common law in force in Utah, placed all civil, chancery, and criminal cases under the jurisdiction of the Federal courts, empowered the United States marshals to draw the grand and petit juries, and provided that in cases of adultery, bigamy, or polygamy, a juror could be challenged if he practiced polygamy or believed in its righteousness. By the aid of this law George Reynolds, private secretary to Brigham Young, was convicted of bigamy, and when the case was appealed to the Supreme Court, that body ruled that religious belief cannot be accepted as justification for an overt act made criminal by the law of the land. In 1882 the stringent Edmunds Law forbade polygamy under heavy penalties and provided that no polygamist should be allowed to vote in any Territory or to hold office under the United States. An amendment to this law (1887) strengthened it in several particulars and dissolved the corporation known as the Church of Jesus Christ of Latter-Day Saints. Within two years after the passage of the Edmunds act about 12,000 voters were disfranchised; and within eight years 468 persons, mostly in the rural districts, were convicted of polygamy or unlawful cohabitation. Many Mormon leaders went into hiding or fled from the Territory. At first the

church vigorously opposed the enforcement of the law, one argument much used being that the law broke up existing families. But in 1890, when the Supreme Court had affirmed the decision of the lower court confiscating the property of the church and declaring the church to be an organized rebellion, the fourth president, Wilford Woodruff, issued a manifesto advising Mormons "to refrain from contracting any marriage forbidden by the law of the land." In 1893 President Harrison issued a proclamation granting amnesty and pardon to all persons liable to the penalty of the Edmunds Law who had abstained from violating it since Nov. 1, 1890, but on condition that they should in future obey the laws of the United States. Three years later, after having repeatedly applied for admission for nearly half a century, Utah was admitted to statehood, but the enabling act stipulated that "polygamous or plural marriages are forever prohibited." Whether this restriction would be adjudged constitutional is doubtful, but the prohibition was incorporated into the State constitution as well. Congress passed an act restoring the confiscated property to the church.

In 1898 Brigham H. Roberts, who was known to be a polygamist, was elected to the national House of Representatives, but was refused a seat. When in 1903 the Utah Legislature elected Reed Smoot to the United States Senate, a determined effort was made to deprive him of his seat. Smoot was a monogamist, but he was an apostle of the church, and charges were filed against him on the ground that the first presidency of the 12 apostles, as a body, "has not abandoned belief in polygamy . . . on the contrary, as the ruling authorities of the church promulgate in the most solemn manner the doctrine of polygamy, etc." The inquiry developed some interesting facts concerning polygamy, and the sixth president of the church, Joseph F. Smith, admitted on the witness stand that he had continued to live with his four wives since the manifesto of 1890 and that they had borne him children since that date. Smoot himself emphatically denied that he had taken any obligation as a Mormon apostle that was inconsistent with his oath as Senator, and submitted figures to show that polygamy was on the decline. After a long investigation the Senate voted (Feb. 20, 1907) not to unseat him, and constitutional lawyers are generally agreed that the decision was a correct one. According to the census of religious bodies made in 1906 by the United States government and published in final form in 1910 the number of communicants embraced in the body of Latter-Day Saints in 1906 was 256,647. In 1890 the number of communicants was 166,125, showing an increase from 1890 to 1906 of 90,522, or 54.5 per cent.

The Mormon church had in 1915 a following of about 500,000 souls. Of these the majority are in Utah, but there are many in Idaho, Arizona, Wyoming, Colorado, and other States. There are also colonies in Mexico and Canada, besides members in every civilized country of the world. Many converts to the faith are made every year in foreign lands and in the United States. The Mormon church as an organization does not enter into politics. Its members, however, take an interest in political and civic problems. It may appear to the outside world that the hierarchy of the church dominates in political affairs because of the fact that every man holds some office in the priesthood which he bears. However, every man is free to take part in politics and to join any national political party that he wishes. The great national parties, Democratic and Republican, have at different times been successful at the polls in Utah.

In November, 1911, an election was held in Salt Lake City under a new commission form of government. In this election the American party's candidate for mayor was defeated by the candidate supported by the Citizens' ticket. It may be inferred, therefore, that the charge often made that Mormons invariably control political matters in Utah is not sustained by the results of these elections.

The Mormons in Utah. The notable industrial and social developments which have accompanied the upbuilding of the Mormon body politic have, perhaps, been too little noticed by non-Mormon writers. Prof. Levi Edgar Young, of the University of Utah, contributes the following account of the industrial, educational, and economic progress of the Mormon people from their beginnings to the present time.

The Mormon people arrived in the valley of the Great Salt Lake July 24, 1847. Here was begun the building up of a united social, economic, and political organization, which in time produced a splendid type of intellectual society and a solid foundation for a prosperous State. The settlers of Utah were a distinct type of authoritative society, accepting as right a prophet and leader who to them has divine authority. It is a demo-theocratic government, for all its people have perfect freedom, politically, socially, and intellectually.

Agriculture became the principal pursuit, and the desert waste was transformed into beautiful private gardens. Agriculture became from the first the keynote to Utah's history and development. Then came manufactures, such as iron foundries, leather, starch, cotton, woolen, shoe, and sugar factories; but those engaged in manufacturing did not lessen the number of hands engaged in the raising of wheat, corn, alfalfa, and potatoes. The modern system of irrigation was used, the first in American history.

In 1850 Millard Fillmore signed the act creating the Territory of Utah, and appointed Brigham Young Governor. Every village in Utah was the distinct Teutonic type of town government. Every town was systematically laid out, with broad streets and walks. This system implied an abundance of land, and the head of each family owned his own home. In the town meeting all the people met to discuss the affairs pertaining to the entire community—the moral, economic, political, and religious. These towns have grown into beautiful cities.

The Mormon people established in Utah the first university west of the Missouri River, as well as the first newspaper, and as early as 1851 established a public-school system. In 1852 they built a theatre, and in 1862 the Salt Lake Theatre was opened, which was the first of its kind in the West. The Mormons built edifices, now world-famed, such as the famous temple and tabernacle at Salt Lake City. They have maintained with the State school system splendid denominational schools, and in every ward, about 700 in number, there are to be found literary societies for the youth that have a wide influence in creating a high educational standard. In 1850 a library of books, worth $5000,

was brought across the plains by ox teams. From that day to the present there have been libraries in the towns and cities of Utah.

In 1862 the overland telegraph was completed to Salt Lake City, and the first message flashed over the wires from Utah was to Hon. J. H. Wade, president of the Pacific Telegraph Company, and was signed by Brigham Young. It read: "Utah has not seceded, but is firm for the Constitution and laws of our country."

In 1850 the first territorial legislature met in Salt Lake City, and during the session a memorial was drawn up asking Congress to construct a transcontinental railroad. A few years afterward, 1869, the Union Pacific and Central Pacific roads were completed, a work in which the people of Utah took an active part.

To-day the economic, social, and intellectual condition of the State is up to the standard demanded by the best of Americanism.

Doctrines and Hierarchy. According to the present official handbook, the religion of the Latter-Day Saints consists of doctrines, commandments, ordinances, and rites revealed from God to the present age. The first principle is faith in God and in Jesus Christ; the next is repentance from all sin; then follows baptism for the remission of sin, as a preparation for the Holy Ghost, bestowed by the laying on of hands. Obedience to these principles is necessary to membership in the church. There having been no communication with heaven for hundreds of years, the world was without divine authority to administer gospel ordinances until Joseph Smith, who was ordained to the lesser or Aaronic priesthood and to the higher or Melchizedek priesthood, received the holy apostleship and the keys of the kingdom with power to seal on earth so that it might be sealed in heaven. Revelations for the whole church are given through its president, who is its earthly head and holds the keys of the kingdom.

Among the later revelations of the church are the doctrines of baptism for the dead and celestial marriage. As there was no authority among men to administer the ordinances of the gospel from the days of the early apostles or shortly after to the time of the restoration of the priesthood to Joseph Smith the prophet, all the baptisms during the intervening period were void. Friends of the dead, however, are permitted to take their names and be baptized in their stead. Other ordinances may also be admitted by proxy, the living in behalf of the dead. According to the revelation on celestial marriage, all unions entered into without divine authority are dissolved by death. Celestial marriage is marriage unto all eternity and is entered into by those who have obeyed the gospel and become the sons and daughters of God by adoption. The woman is given to the man, and they become one flesh. That which is thus sealed on earth is sealed in heaven, and is as valid as though performed in person by the Deity. Wives thus sealed to a man, and their children by him, are his in heaven after the resurrection.

The Mormon hierarchy is as follows: Joseph Smith and Oliver Cowdery were the first two elders and apostles in the church. Smith, who bore the title of prophet, seer, and revelator, stood at the head of the Melchizedek priesthood, of which three presiding high priests, chosen by the body, form a quorum of the presidency of the church. The president of the church and his two counselors form the first presidency. The twelve apostles form a quorum equal in authority and power to the three presidents. The twelve are a traveling presiding high council, under the direction of the presidency of the church, to build up the church and regulate its affairs in all nations. The seventies are also called to preach the gospel and form a quorum equal in authority to that of the twelve. The seventy elders have seven presidents to preside over them, chosen out of the seventy. There are now 192 of these quorums of seventies. In addition to these officers of the Melchizedek priesthood are high priests and elders. The officers of the Aaronic or lesser priesthood are priests, teachers, and deacons. In 1915 there were 71 "stakes" of Zion in the church. Over each stake there is a presidency consisting of a president and two counselors, who are high priests. This presidency bears the same relation to the stake that the first presidency bears to the whole church. A high council in each stake, consisting of twelve members, who are also high priests, acts for the stake as the traveling presiding high council acts for the church in all the world. It is the province of the high priests to preside, while the special calling of the seventy is to travel and preach the gospel and build up the church. See Reorganized Church of Jesus Christ of Latter-Day Saints.

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MORMYR'IDÆ (Neo-Lat. nom. pl., from *Mormyrus*, from Gk. *μορμύρος, mormyros*, sort of sea fish). A family of malacopterous fishes, allied to the pike family, but according to Cope forming a separate group, Scyphophori, having rather long, compressed bodies and a slender tail, swelling out at the origin of the caudal fin. The skin of the head is naked, envelops the gill covers and gill rays, and leaves only a slit for gill opening, and the color is dark. The mouth is small. All the dozen or more species inhabit the rivers of northern Africa and are nocturnal in their activities. The beaked or sharp-nosed mormyrus (*Mormyrus petersi*) is regarded as one of the best fishes of the Nile and is distinguished by the production of the lower jaw into an elongated fleshy appendage. It is caught by lines baited with worms, and is represented on many Egyptian monuments.

MORNAY, môr'nâ', PHILIPPE DE. A Huguenot statesman. See DU PLESSIS-MORNAY, PHILIPPE.

MORNING-GLORY. Various species of *Ipomœa*, especially *Ipomœa purpurea*, cultivated for their large funnel-shaped, diversely colored flowers, which open in the early morning and close during the heat of the day. The garden varieties are propagated from seeds sown in sunny situations in ordinary garden soil. Their large and abundant, roundish heart-shaped leaves make an excellent screen, the vines often attaining a height of 10 feet or more by midsummer. See CONVOLVULUS; IPOMŒA; and Plate of DICOTYLEDONS.

MORNY, môr'nê', CHARLES AUGUSTE LOUIS JOSEPH DE, DUKE (1811–65). A noted French politician of the Second Empire. He was the illegitimate son of Queen Hortense and of the Comte de Flahault, and consequently half brother to Louis Napoleon (later Napoleon III). He was born in Paris, Oct. 23, 1811. The secret of his parentage was well kept for a time and the Comte de Morny received 800,000 francs to adopt him; but he was educated by his grandmother, Madame de Souza-Flahault; and Queen Hortense left him at her death, in 1837, an annuity of 40,000 francs. Morny took a nominal part in the revolution of July, 1830, and entered the army in 1832 as a sublieutenant. He served with some distinction in Algeria, being made a Chevalier of the Legion of Honor; but he soon abandoned military life and in 1838 made his appearance as a manufacturer of beetroot sugar and published a pamphlet on the subject. From that time he was involved in all sorts of commercial and financial speculations. Chosen a deputy in 1842, he became the leader of fashion at Paris, but his financial schemes began to go wrong, and after the revolution of 1848 he attached himself to the cause of his half brother and was one of the prime instigators of the subtle and treasonable policy which culminated in the *coup d'état* of 1851. The morning after the deed was done Morny was made Minister of the Interior. This office he soon resigned, however, and in 1854 he became President of the Corps Législatif, and was Ambassador to Russia during 1856–57, where he married the rich and handsome Princess Troubetzkoi. Morny was created Duke in 1862, and continued his gay and extravagant life up to the time of his death on March 10, 1865. His character was sketched by Alphonse Daudet, who was his secretary, as the Duc de Mora in *Le nabab*. An extract from his memoirs appeared under the title *Une ambassade en Russie* (1856). Consult: De la Guerronière, *Etudes et portraits politiques* (Paris, 1856); Castille, *M. de Morny* (Paris, 1859); A. L. Imbert de Saint-Amand, *The Court of the Second Empire* (Eng. trans. by E. G. Martin, New York, 1898); F. A. Loliée, *Le duc de Morny, the Brother of an Emperor and the Maker of an Empire* (Eng. trans., ib., 1910).

MORO, mō'rō. All the inhabitants of the Philippine Islands who profess the Mohammedan faith are known as Moro. In reality they constitute several tribes with wide variation in dialects and lesser differences in customs and degree of civilization. Some of these people live in settled villages on or near the coast, along rivers or about the shores of lakes, where, in addition to their universal industry of fishing, they carry on a little farming and some manufacture in cloth, brass, and steel. From these, who form the highest type, they grade down to the so-called sea gypsies, who wander from place to place, often living for months in their rude outrigger boats. The Moro is essentially a warrior and makes war on slight provocation. He is not an open, fair fighter, but resorts to cowardly means of attack, and often exhibits great cruelty towards his captives.

Their homes are raised high on poles, often near or above the water. The timbers are lashed together with rattan, and the sides and roof are made of palm leaves sewed together. The furnishings of the average home are very scant, but the *datos*, or men of wealth, often have quantities of brass and other valuable objects on display.

Polygamy is sanctioned by their religion and is universal. Slavery is also a recognized institution and the desire for slaves is one of the chief incentives for raids against neighboring tribes. Since these captives soon became merged into the population, a large element of foreign blood has thus been introduced. Chinese and Arabian traders who have settled on the coasts have also influenced the physical type, as well as culture.

The government is patriarchal, the most prominent member of the order being called a *dato, sultan*, or *rajah*. He has extensive powers over his followers, who may vary from a

few dozen to several thousand. Nominally the Sultan of Sulu is the supreme ruler of this people, but his actual power outside his personal following is very small.

The greater part of this people are now found in the island of the Sulu Archipelago, southern Palawan, and the districts bordering on Lakes Lanao and Baluan, the banks of the Cottabato River, and the northwestern and western coasts of Mindanao.

Consult N. M. Saleeby, *History of Sulu* (Manila, 1908). See PHILIPPINE ISLANDS.

MO'ROC. See HONEY GUIDE.

MOROCCO, mō-rŏk'ō, or **MAROCCO,** called by the natives *Maghrib el Aksa* (the extreme west) or briefly *Maghrib.* An empire or sultanate in the northwest of Africa, under French protection, bounded on the east by Algeria and on the north and west by the Mediterranean Sea, the Strait of Gibraltar, and the Atlantic Ocean. It extends southward into the Sahara, but the boundary in that direction is not exactly determined (Map: Africa, D 1). The Treaty of 1912 gave the French protection over 95 per cent of the country, the Spanish over about 5 per cent, and left about 140 square miles about Tangier as an international zone. Recent estimates give Morocco 219,000 square miles.

Topography. The country is generally mountainous, the Atlas (q.v.) Range, which attains an elevation of nearly 15,000 feet, traversing it in several parallel chains from southwest to northeast, separating the Saharan waste from the more arable land along the Mediterranean, and sending out numerous spurs to both the coast country and the desert. There are, however, many level tracts, especially at the western and eastern extremities and on the borders of the desert. Through the heart of north Morocco extending east and west is a depression, passing just north of Fez, the northern capital, to Oran, Algeria. The central range of the Atlas forms the water parting, separating the streams which flow into the Atlantic and Mediterranean from those which run southward to the desert. The former rivers have the shorter course and less volume, but they are perennial; while the latter become dry in summer, and even when running are lost in the sands of the Sahara. The chief river is the Muluya, with its tributary the Sharef, which drains the northeast of the country and falls into the Mediterranean after a course of 400 miles. The Muluya is of much commercial importance. The Sebu was found in 1905 to be navigable for light boats from the Atlantic to near Fez, 125 miles. The Kus, Bu-Regreg, Um er-Rabia, Tensift, Sus, and Assaka drain the central and western districts and fall into the Atlantic; the Dra, Ziz, Ghir, and other streams irrigate the dry plains of Tafilelt, the first mentioned emptying into the Atlantic Ocean. The other rivers are lost in the desert. All the rivers flowing to the sea are obstructed at their mouths by sand bars, some of which, the French found in 1905, may easily be removed.

Climate. The climate between the central range of the Atlas and the sea, under the influence of marine winds, is temperate, the thermometer seldom falling lower than 40° F., or rising above 90° F., and during the winter months the westerlies bring to this area 20 to 30 inches of rain; but in the southeastern districts extremes of heat and cold prevail and rain is there unknown. The entire country is very healthful and has been recommended and used as a health resort. Malaria, the pest of the other Atlas lands, is almost unknown. Good pasturage is found as far south as Cape Juby, along the Atlantic coast; but dryness prevails throughout the Atlas region, though the winter precipitation covers the mountain tops with snow. This fact, together with the infrequence of wide valleys, makes the mountain region unfavorable for a large population. The settlement among the mountains is confined to the valleys where irrigation is possible and to the lower slopes. In the Saharan steppes cultivation is impossible, excepting in the many small oases where streams, fed by the mountain snows, bring surface or underground supplies of water.

Flora. The flora is richer in flowers and shrubs than in trees. The forests that once covered western Barbary have disappeared and Morocco is largely a treeless country, though some well-wooded valleys are found among the northern ranges. The cedar, mimosa, cypress, and cork oak have commercial value. The date and oil palms, the fig tree, pomegranate, oranges and lemons, apricots, peaches, the almond, and other varieties of fruit and nut trees are all important.

Fauna. The wild animals include the leopard, bear, hyena, and wild hog. The bustard, partridge, and waterfowl abound. The domestic animals comprise the dromedary and the horse, both bred extensively, and mules, asses, cattle, fat-tailed sheep, and goats.

Mineral Resources. The country is rich in iron ore, antimony, and rock salt (north of Fez), and gold and silver, as well as other minerals, are reported. Native hostility has hitherto prevented European enterprise from developing these resources to any considerable extent.

Agriculture. Agriculture and stock raising are almost the only industries. The alluvial soil of the wide plains of the west and east is especially adapted to the cultivation of cereals, and could be brought to a high degree of productiveness by the application of modern agricultural methods. In 1904–05 the French sent several expeditions inland from the Atlantic to study resources, and their reports emphasize earlier ideas as to the value of agricultural and grazing prospects. The chief agricultural products, besides wheat, barley, and other cereals, are olives, dates, oranges, figs, and other kinds of southern fruit, as well as numerous varieties of vegetables. Cotton and sugar cane, once extensively cultivated, have now entirely disappeared, and the cultivation of tobacco is greatly hindered by the adverse sentiment towards its use. The manufacturing industries of Morocco are chiefly devoted to the production of leather, pottery, textiles, including carpets, metal goods of copper and brass, and silver filigree. Fezes are chiefly imported from Austria.

Commerce. The chief exports are hides and skins, barley, wheat, eggs, wool, almonds, cattle, etc. Imports include cotton goods, sugar, tea, provisions, hardware, etc. Purchases of clothing stuffs and metal wares from Europe are constantly increasing. The commerce with Europe is carried on through the ports of Tangier, Tetuan, Laraish, Rabat, Mogador, Mazagan, Casablanca, and Safi, all of them, with the exception of Tetuan, situated on the Atlantic. Fez in the north and the city of Morocco in the south are the centres of the interior caravan trade. The commercial statistics of the country are very

incomplete, but the value of the trade passing through the ports in 1911 was: imports 94,279,000 francs, exports 83,600,000 francs; in 1912, imports 152,497,000 francs and exports 75,047,000 francs. In recent years the foreign trade has shown a tendency to increase. In 1912 imports from and exports to the United Kingdom were valued at 50,725,000 and 15,617,000 francs respectively; France, 49,953,000 and 15,540,000; Germany, 13,209,000 and 17,839,000. As wagon roads and bridges are unknown, commodities can be moved only at large expense.

Government. By the Franco-Moroccan Treaty of March 30, 1912, the Empire of Morocco became a French protectorate, excepting Tangier with surrounding territory, which, nominally Moroccan, became an "international sphere," and excepting the "Spanish zone" in the north, which, together with Ifni, on the coast at the south, was recognized by France in the Franco-Spanish Treaty of Nov. 27, 1912. The shereefian government continues, subject to the control of the French and Spaniards in their respective territories. The French administration, whose seat is at Fez and whose head is the resident commissioner general, may veto any loan or concession, control the relations of natives with foreigners, etc. It is under the Foreign Office at Paris. The Spanish zone is administered, under the control of a Spanish high commissioner, by a khalifa chosen by the Moorish Sultan from two candidates named by the Spanish government.

Prior to the establishment of the French and Spanish protectorates Morocco was an absolute despotism, under a sultan supreme alike in temporal and spiritual affairs. For some years, however, the Sultan and his officials had been subjected to strong external influence, and in 1906 an agreement was concluded between the interested European powers, together with the United States, and the Sultan, which provided for a Moorish police force under command of provincial governors assisted by French and Spanish officers, for a state bank, for tax reform, for purchase of land by foreigners, for certain modern methods of government, etc. The revenue (for which no reliable statistics were available) was derived from monopolies, taxes, customs, and gifts. Taxes were collected with little system, each taxgatherer being obliged to deliver a certain sum regardless of the amount collected. Refusal or reluctance to pay taxes was often followed by harsh measures—reprisals or punitive expeditions. An impartial and well-regulated system of administration of justice was naturally out of the question. The evidence of a Jew or a Christian against a Mohammedan was considered invalid by the native judges. The army of the Sultan in the French protectorate is under French control.

Army. The army was being reorganized in 1915 by the French and was under the command of a French general. Service was to be compulsory, substitution being permitted, and for a period of four years. The garrison at Fez was to consist of two battalions of infantry, two squadrons of cavalry, and a mountain battery. In addition to this garrison, there are nine battalions of infantry, five squadrons, four mountain batteries, one engineer battalion, and certain staff or administrative troops. Companies, squadrons, and batteries are commanded by French officers, a certain proportion of the noncommissioned officers also being French. In 1915 the compulsory feature of service had not become an accomplished fact but was being gradually introduced among the many different tribes composing the population.

Population. Estimates of the number of inhabitants vary widely; the population is often stated at 5,000,000 to 10,000,000, though undoubtedly the latter figure is much too large. One of the most recent estimates is as follows: in the French protectorate, 3,000,000; in the Spanish protectorate, 404,000; in the territory of Tangier, 60,000; total, 3,464,000. The aboriginal Berbers, who dwell in the mountainous districts but whose blood is more or less interfused in the population as a whole, form the most numerous and important race. Arabs inhabit the plains; here also, as well as in the towns, dwell the "Moors," a mixture of Berber, Arabic, and often other elements, and Arabic in culture. There are probably about 150,000 Jews; the Spanish-speaking Jews are the most progressive and prosperous element in the population. There is a considerable negro and mulatto population. Europeans number about 20,000. Education is in a very backward condition, though most males have an opportunity of learning to read the Koran. Excepting the Jews, the natives are among the strictest of Mohammedans. The native capitals are Fez (with over 100,000 inhabitants), Morocco (about 80,000), and Mekinez (about 24,000).

History. Morocco was a Roman province, called Mauretania, and shared in the vicissitudes of the other Roman provinces of northern Africa during the decline of the Empire. It was reached by the tide of Arabian Mohammedan invasion, in 682, but was reduced to submission and to Mohammedanism only after a spirited resistance. Its people participated in the conquest of Spain. For a number of centuries its history is the rise and fall of successive dynasties, of which the most celebrated were the Almoravides and the Almohades (qq.v.), who passed over into Spain and established their power in that country. In fact, during the later Middle Ages Morocco was the source whence new reënforcements were constantly drawn for the declining power of the Moors in Spain. Moorish dominion in Spain came to an end in 1492 with the surrender of Granada to Ferdinand and Isabella by Sultan Boabdil el Chico, and Morocco began to gain strength as an empire through the accession of the Spanish Moors and Jews. Since 1213 the country had been under the reign of the Beni Marin Berbers, who retained their hold until 1524. Then followed the unimportant Saadi period, lasting to 1550, in which year began the dynasty of the Hassani Shereefs, who reigned until 1649. The most important event of this period was the "Battle of the Three Kings" at El Kasar el Kebir in 1578. The deposed Sultan, Mohammed XI, had called upon the Portuguese for aid against the reigning Sultan, Abd el Malek. With 17,000 troops Dom Sebastian, of Portugal, marched upon El Kasar, accompanied by Mohammed XI. The forces of Dom Sebastian and Mohammed XI were annihilated, and all three rulers lost their lives. This battle ended Portuguese influence in Morocco and greatly strengthened the Empire. In 1577 the first foreign ambassador appointed to Morocco was accredited by the English Queen to the "King of Marucos and Fesse." In the same year Henry III of France created a consulate of Morocco and Fez. The Filali period began in 1649 and still continues in the present Sultan. In 1662 the

English occupied Tangier. The city was abandoned in 1684 because of the continuous assaults of the Moors and the interference of home politicians. This evacuation was considered by the Moors to be the most glorious victory of the Sultan, Mulai Ismail, who was one of the most notable of Moorish sultans. His death threw the country into a state of anarchy which lasted for several decades. In 1787 was signed the first treaty between the United States and Morocco, Washington and Mohammed XVIII being the signatories. In 1781 the first United States Consul to Morocco was appointed. War was declared by Morocco upon the United States in 1802 because of the war of the United States with Tripoli. Peace was declared by the Sultan before the news of this declaration reached America. In the seventeenth century the Moorish Empire included most of what is now Algeria and extended south to Guinea. The continuous breaking off of pieces of territory by European nations has reduced it to its present area of about 250,000 square miles, with the southern boundary undefined. Stimulated by the success of Abd el Khader in Algeria the Sultan Abd er Rahman in 1830 entered into negotiations with him and made an unsuccessful attempt to seize the city of Tlemçen, on the Morocco-Algerian border. The resultant treaty with France, which Abd er Rahman signed in 1832, included a clause promising that he would in no way support or communicate with Abd el Khader. When Abd el Khader sought refuge in Morocco in 1844 the French used this act as a reason to occupy the town of Oujdah. Tangier and Mogador were bombarded by the French, and finally the Moors were defeated at the battle of Isly. A treaty of peace followed. A few years later, owing to the differences which had arisen as a result of the loose provisions of the treaty, the French bombarded the port of Sallee. Thereupon their demands were granted. In 1880 a conference of the European powers took place in Madrid for the purpose of establishing the status of foreign residents and the rights and duties of foreign diplomatic and consular representatives in the Empire of the Moors. The code drawn up by this conference was a wise one, and its provisions operated for peace and prosperity up to the time of the Algeciras Conference in 1906. Unlike the Act of Algeciras, it was designed for this purpose. The rapid development of Algeria and the gaining of Tunisia stimulated French interest and gave rise to the dream of a vast North African empire. The development of trade routes in Algeria, which extended into Morocco, had shown France the desirability of this western empire of Islam. Coupled with this was added confidence in her diplomatic ability and in the possibility of coming to an understanding with England concerning African colonial affairs. Undoubtedly the contact between the English and French statesmen brought about by the Egyptian affair made France the gainer by at least a hint concerning what England would permit in Morocco. In 1894 Mulai el Hassan III died, and his son, Mulai Abd ul Aziz, came to the throne. The new Sultan had certain marked leanings towards European standards. These were held in check by Bu Hamed, his Grand Vizier, who had been the chief adviser of his father. But in 1900 Bu Hamed died, and the young ruler was free to attempt to introduce European standards into the administration of the country. A certain portion of the populace objected to this procedure, realizing that it placed their country more at the mercy of European exploiters and took it farther away from Islamic standards. By supporting the Sultan, France permitted the opposition against him to become overwhelming. In the latter part of 1893 trouble broke out between the Rîf tribesmen and the Spanish forces, as a result of which the Moorish government was forced to pay Spain an indemnity of 20,000,000 pesetas, giving a lien upon certain customs duties. In 1901 the oases of Timmimum and T'uat were occupied by the French. In 1902 an uprising under the leadership of Bu Hamara, who improperly claimed to be an older brother of the Sultan and therefore the rightful ruler, gained serious proportions. By 1903 native authority in Morocco had become so weakened by European intrigue that the Sultan asserted himself and dismissed the foreign advisers at his court. Thus two steps had been taken: the revolutionary element had been enabled to continue its opposition; the Sultan had been placed in a position where his return to native standards could not redeem him in the eyes of the Moors, and would condemn him in the eyes of Europe. Under European stimulus a situation more or less comparable to anarchy had thus been created. The seriousness of the situation reached its climax in 1904 with the capture by Raisuli of Ion Perdicaris, a naturalized American citizen. The kidnaping was perpetrated by Raisuli purely as a political move to protect himself from his enemies who had gained the upper hand and were about to have him disgraced and imprisoned. Although a large ransom was paid for the release of Perdicaris, Raisuli's real profit in the transaction was that he was given the governorship of Tangier, and his enemies were degraded or imprisoned. On April 8, 1904, an agreement of vital importance to Morocco was entered into by France and England. The generally disturbed condition of the country was recognized by France as her opportunity to intervene. Intervention resulted in an agreement whereby England, in exchange for a free hand in Egypt, granted the same right to France in Morocco. This agreement was the precursor of the Algeciras convention. The French government promised to make no effort to change the political status of the country, and to maintain British commerce on a footing of absolute equality with its own. France in 1904 faced an alliance with Germany or an alliance with England. That with England meant acceptance of British control of Egypt; that with Germany meant the giving up of all thought of the recovery of Alsace and Lorraine. It was finally decided to treat with England, and under Delcassé the agreement was concluded. The outbreak of the Russo-Japanese war seriously disturbed the balance of power in Europe. Emperor William took advantage of the fact. The war had freed him of anxiety concerning his eastern frontiers, and in the first part of 1905 the Russian disasters in Manchuria led him to a more or less open demonstration of his intentions concerning imperialism in the East and his desire to gain the friendship of Islam. Germany had declared, relative to the Anglo-French convention of April, 1904, that Germany's interests in Morocco were purely commercial and that consequently she had no pressing interests there.

On Oct. 3, 1904, agreement was reached between France and Spain confirmatory of the

Anglo-French agreement and, further, providing for the establishment of a Spanish zone of influence in the country north of El Kasar el Kebir. The hypothetical line drawn at this time as the line of demarcation between the French and Spanish zones later became the line of penetration of the French military forces.

The ground having been cleared for French domination of Morocco and the ultimate establishment of a protectorate, a French diplomatic mission to the Sultan was arranged. It arrived in Fez in January, 1905, and presented to the Sultan a comprehensive programme of reforms. This programme, which took away practically every independent power from the Sultan, clearly demonstrated France's intentions.

Germany immediately executed a coup d'état. On March 31 the German Emperor arrived unexpectedly in Tangier and during his visit gave voice to the determination that German interests in Morocco would be protected. This announcement not only again threw Morocco into the European tangle, but struck directly at the Anglo-French agreement of 1904. War was imminent. In May Count Von Tattenbach, German Minister at Lisbon, visited the Sultan to take advantage of the favorable impression made by the Emperor's words and to gain special privileges for Germany. He was successful to the extent that on May 28 the French programme of reform was rejected in toto on the ground that any reforms proposed for Morocco must emanate from a conference of the signatories of the Treaty of Madrid. By German influence the Sultan was induced to request the holding of such a conference. The French foreign Minister, Delcassé, having thus failed in his Moroccan plans, and having brought the country to the verge of warfare with Germany, resigned (June 6). Rouvier, his successor, in order to avert war, reached an agreement with Prince Rodalin, the German delegate, on June 8, concerning the conference requested by the Sultan. Subsequent German activities in Morocco urged the French to haste, and on September 28 the plans of the conference were agreed upon and it was called to open Jan. 16, 1906, at Algeciras, Spain.

The delegates to this conference were from France, Germany, Austria-Hungary, Belgium, Spain, Great Britain, Italy, the Netherlands, Portugal, Russia, Sweden, the United States, and Morocco. The Act was signed at Algeciras on April 7, 1906, and was proclaimed Jan. 22, 1907. According to the Act, as published, the conference was "inspired by the interest attaching itself to the reign of order, peace, and prosperity in Morocco, and recognizing that the attainment thereof can only be effected by means of the introduction of reforms based upon the simple principle of the sovereignty and independence of his Majesty the Sultan, the integrity of his domains, and economic liberty without any inequality." Briefly the programme outlined by the Act covered: (i) a declaration relative to the organization of the police; (ii) a regulation concerning the detection and repression of the contraband of arms; (iii) an act of concession for a Moroccan state bank; (iv) a declaration concerning a better return of the taxes and the creation of new revenues; (v) a regulation concerning the customs of the Empire and the repression of fraud and smuggling; (vi) a declaration relative to public services and public works. In this conference Austria alone supported the German claims, and German diplomacy was outmanœuvred, inasmuch as the Act opened the way to French control of Morocco. The French agreements with England and with Spain were partially nullified, but on the other hand France was given powers which, by a liberal interpretation of the Act, might be, and eventually were, developed into the right to regulate practically all Moorish affairs. To Spain the policing of the ports of Tetuan and Larache was given; to France the ports of Mogador, Saffi, Mazagan, and Rabat; Tangier and Casablanca to a joint French and Spanish police. It was arranged that in the Imperial Bank France should own three shares of capital as against one share for each of the other countries. A committee of customs to revise the customs duties was provided for; a committee on public works to expend a sum equal to 2½ per cent of the customs duties; and such other committees as were needed were arranged for. The United States Senate ratified the Act on Dec. 12, 1906, and the President on December 14. The United States, however, added an additional protocol declining to assume any responsibility for the enforcement of the provisions of the Act.

In 1907 a French agent, Dr. Mauchamp, was killed by natives in Marakesh. Demand was immediately made by France upon the Moorish government for the punishment of the guilty persons, and until this demand was complied with Algerian troops who had seized and occupied the city of Oujdah on the Morocco-Algerian border were to remain there. The latter part of July the French construction company engaged in the harbor works at Casablanca insisted upon running a construction railroad through a Moorish cemetery, as a result of which natives attacked the French and Spanish workmen and killed a number of them. On August 5 the town was shelled by French warships. Several thousand native Jews and Moors were killed. The occupation of Casablanca followed, and soon the entire Shawia district was under French control. This was in pursuance of the right granted France by the Act of Algeciras to keep order in Morocco. In the summer of 1907 Mulai el Hafid, half brother of Sultan Abd ul Aziz, and the latter's Viceroy in Marakesh, proclaimed himself Sultan and defeated the troops of Abd ul Aziz near Settat. Abd ul Aziz left Fez and sought the protection of the French warships at Rabat, later going to Tangier to retire into private life. Mulai el Hafid, having been supported by the French, was amenable to their suggestions, and under one pretext or another their military operations were extended inland from Casablanca until in 1911 an uprising in Fez, in which a number of French officers lost their lives, resulted in the sending of a strong body of troops to the capital. In 1910 two of the Mannesman brothers, German capitalists and diplomatic agents, personal friends of the Kaiser, succeeded in buying from the Sultan concessions covering about one-fifth of the area of the country.

In 1908 Spain had found itself involved in a "little war" with the natives in the Melilla district, where Spanish capitalists had extensive iron interests. In 1911, following the example of France, Spain sent troops to the town of Larache. This aroused the French, and Spain was forced to abandon the stand she had taken. In midsummer of this year another Moroccan crisis threatened when the German warship *Panther* was sent to Agadir in southern Morocco, where the Mannesman interests had become so impor-

tant. The officers of the *Panther* entertained the most powerful kaids of south Morocco on board ship and promised them Germany's support in resisting French control. War in Europe was again imminent. France and Germany both massed troops on the border; Belgian troops were rushed to the forts of Namur, Liége, and Derviers; and England became active as an ally of France. At the same time Spain sent 3000 troops to Melilla. On September 10 Germany replied to the French proposals concerning Morocco and asked that every claim of German subjects to concessions in that country should be recognized by France; that no new enterprises should be started under the French protectorate without being internationalized equally, and for a free hand in Morocco. The second provision concerned the Mannesman concessions. On November 3 a Franco-German accord was published in which Germany recognized the right of France to establish a protectorate in Morocco; both nations engaged to obtain the adhesion to this accord of the other signatories of the Act of Algeciras; France ceded to Germany, as compensation, about 250,000 square kilometers in the northern French Congo, touching the German Kameruns. France retained the right to run railroad lines across German territory to connect different parts of French Central Africa; France and Germany agreed to submit to The Hague tribunal all difficulties resulting from the accord; France agreed to safeguard the economic equality and commercial liberty for which provision was made in existing treaties, and it was mutually agreed to take over the rights and obligations in connection with the companies holding commercial concessions in Morocco. In April, 1912, a Franco-Spanish agreement was consummated concerning the administration of the country—in the Spanish zone under a Spanish high commissioner to act in conjunction with the French Governor-General at Fez. On March 12 the Franco-German agreement was ratified, confirming the French right to establish a protectorate which was formally established in 1913. This was a great diplomatic defeat for Germany and caused bitter feeling in German official and industrial circles. Soon after that the German army was increased, which was followed by the passing of the three-years military law in France; this prepared the way for the Great European War of 1914. On May 30 Fez was attacked by native tribes and additional French troops were sent to that point. In 1913 Mulai Abd el Hafid abdicated and Mulai Yusef became Sultan at the dictation of French statesmen. In 1914 the line separating the French and Spanish zones had been extended from Casablanca to Fez and eastward therefrom to Taza. From Oujdah French troops had progressed westward to Taza and in the latter part of the year Taza surrendered. The dividing line was complete. The breaking out of the European War brought disturbances in Morocco, as Germany had come to be looked upon as a friend of Islam.

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MOROCCO, MAROCCO, or **MARAKESH,** mä'rȧ-kĕsh'. One of the capitals of the Sultanate of Morocco. It is situated on the north slope of the Great Atlas Range, 90 miles from the Atlantic coast and 250 miles southwest of Fez (Map: Africa, D 1). Its location in a large plain near the foot of the Atlas is very favorable, the elevation being estimated at from about 1400 to over 1600 feet. The city has a healthful though hot climate, but is in a very backward and dilapidated condition. It covers a large area, surrounded by a wall, now more or less in ruins, with a height of 25 to 30 feet and a length of about 7½ miles. A large part of the space within is occupied by gardens, open areas, and market places, but in the built-up portions the streets are narrow, crooked, and dirty, and the houses are ill-kept, mostly one-storied, lime-and-earth buildings, with unglazed window openings. There are 19 mosques. A notable feature is the tower of the Kutubia Mosque, 230 feet high and of the type of the Giralda at Seville; this is almost the only stone edifice in the city. The Imperial Palace comprises an irregular conglomeration of buildings and gardens in the southern part of the city, covering 180 acres and surrounded by a wall. Of late years it is but seldom visited by the Sultan. The only industry of note is the manufacture of morocco leather. There is still considerable local trade carried on with the surrounding country and with the port of Mogador (q.v.). Traffic is largely in the hands of the Jews, who live under repressive conditions in a separate quarter of the city. The number of inhabitants is not known with certainty, but is commonly estimated at 50,000 to 75,000; however, the *Annuaire du Maroc* (Algiers) states the population at 80,000, of whom about 17,000 are Jews and 500 Europeans. The people are turbulent in disposition, and crimes of violence are common. Morocco was founded about 1070. It reached the height of its prosperity in the thirteenth and fourteenth centuries, when its population is said to have been 700,000. It was then a famous Mohammedan seat of learning. Its decline was brought about by several centuries of civil wars and rebellions.

MOROCCO GUM. See GUMS.

MOROCCO LEATHER. See LEATHER.

MORÓN, or **MORÓN DE LA FRONTERA,** mō'rōn' dȧ lȧ frōn-tā'rȧ. A town of south Spain,

in the Province of Seville, 32 miles southeast of the city of that name, on the Guadaira (Map: Spain, C 4). On one of the high and steep hills surrounding the town are the remains of a once almost impregnable castle erected by the Moors on Roman foundations and surrounded by triple walls and towers. The castle was occupied by the French in 1810 and was blown up by them on their departure. The inhabitants are engaged in the production of olive oil and in the vicinity are marble quarries and mines of red hematite. Pop., 1900, 14,459; 1910, 17,099.

MO'RON. See MENTAL DEFECTIVES.

MORONG, mō'rŏng. A town of central Luzon, Philippines, capital of the Province of Rizal. It is situated on the north shore of the Laguna de Bay, 19 miles east-southeast of Manila. Pop., 1903, 5276. It is a busy industrial town.

MORONG, THOMAS (1827–94). An American botanist, born at Cahaba, Ala. The family removed to Massachusetts while he was a boy, and he graduated at Amherst in 1848. He studied law, but later entered Andover Theological Seminary, and completed his studies in 1853. During his early life he was devoted to botany as an amateur, and in 1888 he undertook an extended voyage of exploration and botanical collection in South America and visited Argentina, Paraguay, and Chile. Upon his return, in 1890, he was made curator of the herbarium of Columbia College, in New York City. In conjunction with Dr. N. L. Britton he published *An Enumeration of the Plants Collected by Dr. Thomas Morong in Paraguay, 1888–90.* He was one of the contributors to the *International Encyclopædia.*

MORONI, mō-rō'nē, or **MORONE,** GIAMBATTISTA (c.1525–78). An Italian portrait painter of the Brescian school, born at Albino, near Bergamo. He was a pupil of Moretto and was also influenced by Lotto. Moroni is the only painter produced by the Italian Renaissance who painted solely portraits. He is an excellent draftsman, and his portraits are direct and characteristic likenesses. In his best works, like the portraits of a "Tailor" (National Gallery, London) and "Bartolommeo Bonga" (Metropolitan Museum, New York), he is likewise a colorist of the first rank. Though it is always vital, much of his work, like the double portrait of a "Gentleman and his Wife" (Metropolitan Museum, New York), is hard and dry in effect. Other good examples of his work are "Widower with Two Children" (Dublin Gallery); "Old Man and Boy" (Boston Museum); portrait of a "Lady" (Walters Gallery, Baltimore); full-length portrait of a "Man" (Gardner collection, Boston); portrait of a "Man" (Wilstach collection, Philadelphia). A large number of his works are in the Brescia, and he is also well represented in the galleries of Milan, Florence, Vienna, and Berlin. His art is too literal for success in religious painting, in which he is a follower of Moretto.

MOROSINI, mō'rō-zē'nē, originally MOROSI. A family of Venetian nobles, dating from the eighth century. Four of the family became doges, three of its women wives of doges and two others queens (Tommasina of Hungary and Constance of Servia), and many of them occupied other public positions. The first celebrated member of the family was DOMENICO MOROSINI, Doge from 1148 to 1156.—MARINO MOROSINI was Doge from 1249 to 1252.—MICHELE MOROSINI, Doge for less than a year (1382), was celebrated as a financier.—ANDREA MOROSINI (1558–1618) became historiographer of the Republic (1598) and held several public offices, besides being one of the Council of Ten. He wrote a history of Venice from 1521 to 1615, first published in 1623, and *Imprese ed espedizioni di Terra Santa e l' acquisto fatto dell' imperio di Constantinopoli dalla repubblica di Venezia* (1627), a history of the Fourth Crusade.—FRANCESCO MOROSINI (1618–94) gallantly but unsuccessfully defended the fortress of Candia against the Turks in 1667–69. About 20 years later he conquered nearly all of the Morea, which gained him the surname of Il Peloponnesiaco. He was elected Doge in 1688. Consult: Morosini, *Francesco Morosini il Peloponnesiaco* (Venice, 1885); Bruzzo, *F. Morosini nella guerra di Candia e nella conquista di Morea* (Forli, 1890); Cicogna-Soranzo, *Bibliografia veneziana* (Venice, 1857, 1885).

MOROT, mō'rō', AIMÉ NICOLAS (1850–1913). A French historical and portrait painter, born at Nancy. He studied under Cabanel and at the Ecole des Beaux-Arts, where he was awarded the Prix de Rome in 1873. He is best known for his portraits of members of the fashionable and artistic world of Paris, including Prince d'Arenberg, Edouard Dumont, and E. Hébert (1905, Luxembourg). They are excellent likenesses, correctly painted, and cool in color. His battle pieces display great action and force. One of his earliest works, "The Battle of Aquæ Sextiæ," is in the Nancy Museum; "Rezonville, Aug. 16, 1870" is in the Luxembourg, and "Charge at Reichsoffen" is at Versailles. He became Officer of the Legion of Honor and member of the Institute.

MOROTOCO, mō'rō-tō'kō. One of a group of sedentary agricultural tribes residing about the Oxuquis River, on the border of the Chaco region, in southeastern Bolivia. The entire group constitutes a distinct linguistic stock, the Samucan. The Morotoco are remarkable in being apparently ruled by the women. The men do the household drudgery, although they are tall and robust and daring hunters. The women refuse to have more than two children, strangling any born above that number. Consult Kersten, in *International Archiv für Ethnographie* (Leyden, 1904).

MORO VAN DASHORST. See MOR.

MOR'PETH. A market town and a parliamentary and municipal borough in Northumberland, England, on the Wansbeck, 17 miles north of Newcastle (Map: England, E 1). The principal buildings are the fourteenth-century parish church of St. Mary, the old clock tower, the free grammar school of Edward VI, founded in 1552, and the town hall, erected by Sir John Vanbrugh. The town owns remunerative property, the markets, and provides a free water supply. It has flannel manufactures, iron foundries, collieries, quarries, machine shops, brick kilns, tanneries, and malt works. It is an important market for cattle. There are remains of a castle and gateway. Morpeth was a Saxon town of importance before the Conquest and was granted corporate privileges by Charles II. Pop., 1901, 6158; 1911, 7433.

MORPHE'A (Neo-Lat., from Gk. μορφή, *morphē*, form). A chronic skin disease, sometimes called circumscribed scleroderma or Addison's keloid, consisting of patches, rounded or irregular in outline, pale yellow or brown in color, and sometimes following the course of a

superficial nerve. It occurs usually in young adult women, on the breasts, face, and neck.

MORPHEUS, môr'fūs (Lat., from Gk. *Μορφεύς, Morpheus*, shaper, fashioner; cf. Gk. *μορφή, morphē*, form, shape). In classic mythology, the son of Somnus (Sleep), called the Shaper because he shapes or molds the dreams that visit the sleeper. He is first mentioned by Ovid, *Metamorphoses*, xi, 633 ff., and is represented as an old man with wings, pouring somniferous vapor out of a horn. Consult C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911).

MORPHINE, môr'fīn *or* -fēn, or **MORPHIA,** môr'fī-ȧ (from Lat. *Morpheus*, god of dreams), $C_{17}H_{19}NO_3 + H_2O_1$. The most important of the 20 or more alkaloids existing in opium, of which it constitutes one-eighth to one-sixteenth by weight. Good opium should contain at least 9 per cent of morphine when assayed. In physiological activity one-fourth of a grain of morphine equals one grain of opium. It was first isolated in 1816 by Sertürner, a chemist of Hanover. It occurs in combination with meconic and sometimes sulphuric acid, as colorless, shining, prismatic crystals, odorless, and having a bitter taste. It is soluble in 1040 parts of water at 176° F. and in 6 of alcohol at 140° F., less soluble in ether and chloroform, and insoluble in benzene. The following are the common tests for morphine: Concentrated nitric acid when applied to morphine or its salt gives an orange color, changing to yellow; when it is mixed with iodic acid iodine is liberated, which may be recognized by the well-known starch test; a neutral solution of a morphine salt produces a blue color with a neutral solution of ferric chloride. Morphine combines with acids to form crystallizable salts, which are readily soluble in water and alcohol. Of these the sulphate, hydrochlorate (or muriate), and acetate are used in medicine. Apomorphine (q.v.), a powerful emetic, is prepared by heating morphine for some hours with an excess of hydrochloric acid.

The therapeutic uses of morphine and its salts are similar to those of opium (q.v.), but morphine acts more certainly and quickly and is more readily absorbed than opium, is more suitable for hypodermic use and is less apt to constipate and cause gastric disturbances.

The habitual taking of morphine is not uncommon. Those addicted to this habit become dependent for a comfortable existence on the drug and gradually increase the dose until enormous amounts are taken. The habit can be effectually treated only in institutions where the patient can be kept under constant surveillance. See ALKALOIDS; DRUG ADDICTIONS.

MOR'PHOGEN'ESIS (Neo-Lat., from Gk. *μορφή, morphē*, form + *γένεσις, genesis*, origin, from *γίγνεσθαι, gignesthai*, to become). A term proposed by Haeckel, who divides morphology (q.v.) into the two coördinated branches of anatomy and morphogenesis or morphogeny. Morphogenesis is the equivalent of embryology or developmental history. It takes into account the gradual development and building up of the form of the adult, i.e., the series of changes and the mode by which the body and its organs become shaped. Haeckel further subdivides morphogenesis into ontogeny (q.v.) and phylogeny (q.v.). Consult Ernst Haeckel, *Generelle Morphologie der Organismen* (2 vols., Berlin, 1866), new edition under title of *Prinzipien der generellen Morphologie der Organismen* (ib., 1906).

MORPHOL'OGY (from Gk. *μορφή, morphē*, form + *-λογία, -logia*, account, from *λέγειν, legein*, to say). In zoölogy, the science of form and structure of animals. It is based on comparative anatomy and embryology and lays the foundation for physiology. We cannot well understand the structure or anatomy of the fully grown animal unless we have the history of the development of the organism as a whole and of the separate organs. The morphologist, whose methods of study are based on observation and comparison, must not only be a comparative anatomist, but also an embryologist. He should not only be acquainted with the individual development (ontogeny, q.v.), but also that of the class or phylum to which the organism belongs (phylogeny, q.v.). Moreover, as the existing living beings are the descendants of long lines of ancestry, the morphologist should have at his command all the available facts as to the fossil relatives of existing forms. Though we owe the word "morphology" to Goethe, it was first brought into its present extended use by the zoologists J. Müller and Leuckart. But long before the middle of the last century the general morphology of organisms was in part discussed by Oken, Carus, Goethe, Geoffroy Saint-Hilaire, Lamarck, Cuvier, Savigny, Owen, and Agassiz. For example, Goethe compared the flowering plant to an axis bearing modified or metamorphosed parts or leaves; Savigny discovered that the mouth parts or appendages of the heads of insects were modified legs; and Carus, Audouin, and Strauss-Durckheim perceived that their head was composed of a number of segments. Goethe, and also Oken, described a segmental structure in the vertebrate skull—a theory entirely abandoned by modern morphologists. That portion of the history of zoölogy called the Period of Morphology was signalized by the brilliant results in developmental work of Von Baer, Pander, J. Müller, Rathke, followed by the later researches of Schwann, Schleiden, Koelliker, Huxley, Vogt, Gegenbaur, Haeckel, and their followers. As the result we see numerous morphological problems either solved or in a fair way of solution.

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MORPHOLOGY OF PLANTS. The study which treats of the structure of plants. Morphology began as a study of the gross structures of mature plants, but to this there have been added the minute structures, the development of tissues and of organs, the ontogeny of individuals (often called embryology), and finally the evolution of the plant kingdom. (See BOTANY.) That part of morphology which deals with tissues is usually called anatomy, the term "morphology" being reserved for the reproductive

structures in general. This distinction, however, is artificial, especially since vascular anatomy is joined with the reproductive structures in elucidating the evolution of plants. An outline of morphology, therefore, is an outline of the evolution of plants.

Thallophytes. The two principal groups, algæ (q.v.) and fungi (q.v.), must be considered separately, since they hold very different relations to the evolution of plants.

Algæ.—The algæ are the primitive plants, in the sense that they preceded the other groups historically. All of their structures are related to water as a medium, so that the plant kingdom, so far as the present flora is concerned, began in water. The simplest body is a single cell, but in the group the body advances from the single cell, through cell colonies of various kinds, to many-celled individuals. The prevailing forms of the many-celled bodies among the algæ are simple or branching filaments, usually anchored. Among the higher algæ the body often becomes differentiated into different regions, notably among the marine forms. Among the brown seaweeds, e.g., the body of the kelps is differentiated into holdfast, stipe, and leaf-like expansions. The simplest form of reproduction is vegetative multiplication, in which new individuals are formed by ordinary cell division. In addition to this, algæ developed reproduction by means of spores, which in most cases are swimming cells (zoöspores). Among the algæ there appears also sexual reproduction, at first the gametes seeming to be alike, then differentiating in appearance, so that they are recognized as sperms and eggs. The two kinds of gametes at first are produced by ordinary vegetative cells, but later special cells produce them, known as oögonia and antheridia.

Fungi.—The fungi are notably dependent plants, in the sense that they depend upon other plants and upon animals for their food supply, the lack of chlorophyll forbidding food manufacture. Fungi secure food in two ways: as parasites they obtain it from living bodies; while as saprophytes they obtain it from material that has been produced by a living body and is no longer connected with it. For example, when the rust fungus attacks wheat, it is obtaining food from living plants; but when a mold fungus attacks bread, it is obtaining food from material produced by living plants, but no longer connected with them. It is evident that fungi may be very useful, as are the soil fungi, or they may be very injurious, as are the disease-producing fungi. The bodies of fungi range from single cells (as the bacteria) to filamentous bodies (the mycelia of true fungi), and many of the higher forms become quite complex. The reproductive methods are also the same as those of algæ, viz., vegetative multiplication, spore reproduction, and sexual reproduction with its differentiations. Among the higher fungi, however, the sexual reproduction becomes less and less obvious, and in some cases it may have disappeared. While the algæ may be said to represent the foundation upon which the plant kingdom has been built, the fungi hold no relation to the higher groups, but in general are regarded simply as degenerate algæ.

Bryophytes. The bryophytes represent the first land plants, having been derived from algæ that acquired the land habit, which means exposure to air as a medium. The danger of this exposure is the loss of water by the plant, and the structures and habits of land plants are explained by this fact. Among the bryophytes the liverworts (Hepaticæ, q.v.) are the important genetic group, having been derived from the algæ and having given rise to the higher plants. The mosses (Musci, q.v.), on the other hand, represent a specialized branch from the liverworts, distinguished from the latter by the leaf shoot and the much more complex spore case. The establishment of the land habit made possible the further development of plants on the land surface. In consequence of this change in the conditions of living, the plant bodies of liverworts are much more compact and possess protective structures against excessive loss of water by evaporation. Not only are the working bodies protected, but the sexual cells are jacketed, so that the sex organs (antheridia and archegonia) are many-celled. The most significant result of the land habit was the establishment of an alternation of generations (q.v.), so that sporophyte and gametophyte alternate regularly in the life history. Among bryophytes the gametophyte is the conspicuous generation, because it manufactures food in addition to producing sex organs, and the sporophyte is dependent upon it. In one group of bryophytes (*Anthoceros*) the sporophyte is green, so that the possibility of an independent sporophyte is evident. The further progress of the plant kingdom is dependent upon independent sporophytes, because the free display of green tissue by a gametophyte means conditions unfavorable for the swimming of sperms necessary to fertilization, while the free display of green tissue by a sporophyte means conditions favorable also for the dispersal of spores.

Pteridophytes. The pteridophytes represent the first vascular plants, the vascular system having been developed in connection with an independent sporophyte. The so-called vessels are thick-walled, tubular cells that extend through the sporophyte and are equipped to conduct water. Associated with the vascular system are the first roots among plants—organs for the intake of water—and also the first sporophyte leaves. The vascular system, roots, and leaves represent one mechanism, each part of which is necessarily related to the other parts. Among the pteridophytes, the chief living representatives of which are the club mosses (Lycopodiales, q.v.), the horsetails (Equisetales, see EQUISETUM), and the ferns (Filicales, see FERN), the conspicuous and independent sporophyte is in sharp contrast with the very inconspicuous gametophyte. Among ferns, e.g., the gametophyte (prothallium) is a very small, liverwort-like body, often not larger than the head of a pin. It is among the pteridophytes that the structure called the strobilus (q.v.) appears, a structure that is the precursor of the flower. The strobilus is not a feature of all pteridophytes, not appearing among ferns, but it is a structure begun by the group. Another important fact associated with the pteridophytes is the appearance of heterospory (q.v.), for this is the precursor of the seed. This means a differentiation of spores into two kinds, one kind (microspores) producing the male gametophytes, and the other kind (megaspores) producing the female gametophytes. Another accompaniment of heterospory is that the gametophytes are dependent and so small that they remain within the spores that produce them, thus disappearing from ordinary observation.

Spermatophytes. The seed plants are the most conspicuous plants of the present flora, for they make up nearly all the vegetation commonly observed. They have developed as two great groups: the gymnosperms, in which the seeds are exposed; and the angiosperms, in which the seeds are inclosed. The gymnosperms are the ancient seed plants that are now much less numerous than the more modern angiosperms.

Gymnosperms.—The gymnosperms represent the first seed plants, continuing and advancing the structures of the ferns, from which they differ chiefly in the presence of seeds. The vascular system is notably developed, resulting in larger sporophyte bodies and in a larger display of foliage. The early gymnosperms did not have strobili (cones), resembling the ferns in this feature, but all other gymnosperms have strobili as a very conspicuous structure. The important fact about gymnosperms is the existence of seeds. A seed is derived from an ovule, and an ovule is a megasporangium. The difference between an ovule and other megasporangia is that the ovule retains its megaspores instead of shedding them. This retention of the megaspore means that the female gametophyte develops within the ovule, that fertilization occurs there, and that the embryo sporophyte develops there. When all of these structures within the ovule become incased by a hard coat (testa), the total structure is a seed. Among gymnosperms the transportation of pollen (pollination) is effected by the wind, and after fertilization the egg develops an embryo, which then passes into a dormant stage. Activity is resumed when the conditions for seed germination are present.

Angiosperms.—The angiosperms are far more varied and abundant than are the gymnosperms and constitute the conspicuous vegetation of the land surface. Three features of the group stand out conspicuously in contrast with the gymnosperms. The first feature is the inclosed ovule, the inclosing structure being the carpel. This means that the pollen grains containing the male gametophytes cannot reach the ovule, but are received by a special region of the surface of the carpel (stigma). This means further that the pollen tube must traverse the style, enter the cavity of the ovary, reach the tip of an ovule, and then penetrate the tip of the ovule until the egg is reached. The second feature is the appearance of the flower, which differs from a strobilus in having another set of members added to the sporophylls, and this set (perianth) is usually differentiated into sepals (calyx) and petals (corolla). The third feature is related closely to the second, for it is the development of insect pollination. Many angiosperms retain the old method of wind pollination, but insect pollination is a conspicuous feature of the group, and it is associated with the remarkably diversified development of the flowers. It should also be stated that among angiosperms the male and female gametophytes are reduced to their lowest terms, the former being represented by three nuclei within the pollen grain, and the latter at the fertilization stage by seven free cells within the ovule, one of which is the egg.

Vascular System. The use of the vascular system in interpreting the evolution of vascular plants demands that its important features should be indicated. In a cross section of a vascular stem two very distinct regions are observed, viz., the cortex and a central cylinder called the stele. It is in the stele that the vascular cylinder of the stem develops. This cylinder always comprises two regions, known as xylem (wood) and phloëm (bast), the former being the water-conducting region. Each of these regions is characterized by its vessels, the vessels of the xylem being tracheids or tracheæ, while those of the phloëm are sieve vessels. In general, the xylem of pteridophytes and gymnosperms consists of tracheids, while that of angiosperms is characterized by tracheæ.

There are three types of vascular cylinder which represent different stages in the evolution of vascular plants. The most primitive type of cylinder is called the protostele, which is a solid cylinder, in which the phloëm completely surrounds the xylem. This type of cylinder is characteristic of all roots and of the stems of the most primitive pteridophytes, such as the club mosses. A second type of vascular cylinder is the amphiphloic siphonostele (solenostele), which is a hollow cylinder (i.e., incloses a pith region) in which the phloëm occurs on both sides of the xylem. This type of cylinder is characteristic of the stems of ferns, among which a modification of it is found, called the polystele. The polystele simply means an amphiphloic siphonostele which in the adult plant breaks up into separate and more or less scattered strands, thus breaking up the appearance of a hollow cylinder. The maidenhair fern is an excellent illustration of the amphiphloic siphonostele, while the common bracken illustrates the polystele. A third type of vascular cylinder is the ectophloic siphonostele, which is a hollow cylinder in which all the phloëm is external to the xylem, i.e., the xylem is in contact with the pith. This type of cylinder is characteristic of all the seed plants, and for this reason is regarded as the most advanced type. It also has its polystelic modification among the monocotyledons, in which the hollow cylinder is broken up into separate and scattered bundles as the plant matures. For this reason the monocotyledons are described as having scattered bundles, but all young monocotyledons have vascular cylinders. One of the characteristic features of the ectophloic siphonostele is the development of a cambium layer between xylem and phloëm which makes possible an increase of the stem in diameter.

In most cylinders the vascular tissues are not continuous, but occur in separate strands or bundles, separated from one another by undifferentiated tissue, called pith rays, which extend from the pith to the cortex. In this way the pith rays seem to differentiate the cylinder into vascular units, which have been called vascular bundles. The character of these bundles varies in the evolution of vascular plants, according to the relation between xylem and phloëm. There are four such arrangements: (1) radial, in which xylem and phloëm occur in alternating radii, an arrangement characteristic of roots; (2) concentric, in which the phloëm completely surrounds the xylem, an arrangement characteristic of the stems of pteridophytes; (3) collateral, in which xylem and phloëm occur side by side upon the same radius, the xylem being towards the pith and the phloëm towards the cortex, an arrangement characteristic of the stems of gymnosperms and dicotyledons; (4) amphivasal, in which the xylem completely incloses the phloëm, an arrangement characteristic of the stems of monocotyledons.

Another feature of the vascular system which

has proved to be significant in the evolution of vascular plants is the relation of the first-formed xylem to that which develops later. At their first appearance in the stele, the vascular elements are laid down at certain definite points, these first elements being called the protoxylem. From these protoxylem strands the later xylem (metaxylem) extends. The three situations developed in the evolution of the vascular system are as follows: (1) exarch, in which the protoxylem occurs at the periphery of the stele, and consequently all the metaxylem is centripetal; (2) mesarch, in which the protoxylem occurs more or less within the stele, so that the metaxylem develops both centripetally and centrifugally; (3) endarch, in which the protoxylem develops only centrifugally. The exarch condition is characteristic of all roots and of most protosteles; the mesarch condition is characteristic of ferns; while the endarch condition is characteristic of all seed plants.

The various combinations of cylinder type, bundle type, and protoxylem position indicate the relative advancement of any group of vascular plants. Many other features of the vascular system are being used for the same general purpose, and since the vascular tissue is the most persistent of all plant tissues, it is through vascular anatomy that we have become acquainted definitely with the history of vascular plants.

The best conception of the present condition of plant morphology may be obtained by reading the general articles on BRYOPHYTES; PTERIDOPHYTES; SPERMATOPHYTES; THALLOPHYTES; and the more special articles on ALGÆ; ANGIOSPERMS; EQUISETUM; FERN; FUNGI; GYMNOSPERMS; HEPATICÆ; LYCOPODIALES; and MUSCI. A still more detailed account of plant structures may be obtained from the separate titles which deal with the prominent phenomena and organs, such as ALTERNATION OF GENERATIONS; ANTHERIDIUM; ARCHEGONIUM; HETEROSPORY; LEAF; ROOT; SEED; SPORE; STEM.

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MORPHOT'ROPISM (from Gk. *μορφή, morphē*, form + *τροπή, tropē*, a turning, from *τρέπειν, trepein*, to turn). The study of the phenomenon of the small but distinct change in crystalline form produced by the replacement of a chemical element or radical group in a substance by another closely related to it. By comparing the crystal forms of a series of closely related substances the part played by each constituent substance may be inferred, especially when the substitution methods of organic chemistry are applied to substances having very large chemical molecules. See CRYSTALLOGRAPHY.

MOR'PHY, PAUL CHARLES (1837–84). An American chess player, born in New Orleans, La. He was remarkably precocious, especially as a chess player, and before he was 13 had defeated many well-known amateurs. He studied law for several years at the College of South Carolina, playing chess only occasionally. At the first American Chess Congress, which assembled in New York in 1857, Morphy defeated with ease the best players that could be brought to meet him. He visited Europe in 1858, and in England beat Löwenthal, Boden, and Bird, and performed the most astonishing feats in simultaneous games without the board. In Paris he won five out of eight games with Harrwitz, and continued his exhibitions of blindfold playing. After his return to the United States, in 1859, he won seven out of eleven games with the visiting German expert Anderssen. He was admitted to the bar and began the practice of law in New Orleans. The strain occasioned by his blindfold contests, however, had been too great for his mental faculties, and, though he abandoned chess altogether, he was soon forced to relinquish all mental occupation and died in retirement. During the comparatively short period of his activity Morphy displayed a skill that was inexplicable. He was at no time a close student of chess and he played without preparation and with little hesitation; but an analysis of his games reveals combinations remarkable for finesse, depth, elegance, and soundness. These qualities, combined with a wonderful memory, made him perhaps the most remarkable chess player in modern times. Consult Löwenthal, *Morphy's Games of Chess* (London, 1860).

MORRA. An Italian game. See LA MORRA.

MOR'RILL, JUSTIN SMITH (1810–98). An American legislator and political leader. He was born at Strafford, Vt., and after an elementary education was engaged in business and farming until 1855, though he gave much time to study. As an antislavery Whig he was elected to Congress in 1854, was five times re-elected, in 1867 took a seat in the Senate and served continuously until his death, a record up to that time. During the latter part of his service in the House he was the leading member of the Committee on Ways and Means, of which he was chairman from 1865 to 1867, and chairman of the Subcommittee on Tariff and Taxation. In the Senate he was a member after 1867, and chairman for many years, of the Committee on Finance. He will be remembered chiefly for his connection with two important measures. In 1857 he introduced a bill for the establishment, through the aid of public land grants, of State colleges throughout the country primarily for the purpose of teaching agriculture and the mechanic arts, other subjects, however, not to be excluded. This bill was vetoed by President Buchanan, but became a law in 1862 through the signature of President Lincoln. By virtue of this act and the supplementary Second Morrill Act, so called (1890), there had been established, by 1915, 67 institutions

giving instruction to 69,000 students. Morrill also framed and introduced in the House the Morrill Tariff Act of 1861. (See TARIFF.) He opposed government paper money (and especially the Legal Tender Act of 1861–62), and the annexation to the United States of outlying territory. He published *The Self-Consciousness of Noted Persons* (1886). Consult: F. W. Taussig, *Tariff History of the United States* (New York, 1888; 5th ed., 1910); G. W. Atherton, *Legislative Career of Justin S. Morrill* (Washington, 1901); E. J. James, *Origin of the Land Grant Act of 1862* (Urbana, Ill., 1910).

MORRILL, LOT MYRICK (1813–83). An American legislator and cabinet officer, born at Belgrade, Me. He became a student at Waterville (now Colby) College in 1833, but left before graduating to enter a law office at Readfield. In 1837 he was admitted to the bar, and for several years practiced in partnership with Timothy O. Howe. In 1841 he removed to Augusta, where he won wide distinction as a lawyer and public speaker. Although strongly opposed to the extension of slavery, he was in all other matters in perfect agreement with the Democratic party, and became one of the leaders of the Maine Democracy. In 1853 and 1854 he was elected to the Lower House of the State Legislature, and in 1856 was elected to the State Senate. After Buchanan's nomination, disapproving of his party's platform, he resigned from the Democratic State Committee and allied himself with the Republican party. He was elected Governor of the State by that party in 1857 and was reëlected in 1858 and 1859. In 1861 he was chosen United States Senator to succeed Hannibal Hamlin. Reëlected for a full term in 1863, he was defeated by a single vote in 1868 by Hamlin, but in the following year was elected to succeed William P. Fessenden for the remaining part of the latter's term. In 1871 he was again elected to the Senate, but in 1876 resigned to enter the cabinet of President Grant as Secretary of the Treasury. This portfolio he held until after the inauguration of President Hayes in 1877. Thereafter until his death he was collector of customs for the Portland (Me.) district.

MOR'RILLTON. A city and the county seat of Conway Co., Ark., 51 miles by rail northwest of Little Rock, on the Arkansas River and on a branch of the St. Louis, Iron Mountain, and Southern Railroad (Map: Arkansas, C 2). It has a trade in cotton and live stock and manufactures of cottonseed oil, woolens, machine-shop products, lumber, furniture, etc. The water works and electric-light plant are owned by the municipality. Pop., 1890, 1644; 1900, 1707; 1910, 2424.

MOR'RIS. A city and the county seat of Grundy Co., Ill., 62 miles southwest of Chicago, on the Illinois River, the Illinois and Michigan Canal, and the Chicago, Rock Island, and Pacific and the Chicago, Ottawa, and Peoria railroads (Map: Illinois, H 3). It has St. Angela's Academy, a Roman Catholic institution for women. The city is the centre of a considerable trade in grain and cattle, and there are mines of bituminous coal and manufactories of oatmeal, hardware, paper car wheels, leather, cut glass, fibre board, novelties, bricks, and tile. The water works are owned by the municipality. Morris was settled in 1834 and incorporated first in 1857. Pop., 1900, 4273; 1910, 4563.

MORRIS. A city and the county seat of Stevens Co., Minn., 157 miles west by north of St. Paul, on the Northern Pacific and the Great Northern railroads (Map: Minnesota, B 5). It is near the Pomme de Terre River, which furnishes good water power. Situated in a fertile agricultural region, Morris carries on a large trade in produce, and has several grain elevators and flour mills. It is the seat of the West Central School of Agriculture and the Assumption School (Roman Catholic), and contains a fine high school, general hospital, and a Carnegie library. The water works are owned by the city. Morris adopted the commission form of government in 1913. Pop., 1900, 1934; 1910, 1685.

MOR'RIS, ALEXANDER (1826–89). A Canadian statesman, born at Perth, Ontario. He was educated at the University of Glasgow and at McGill University, Montreal, and was called to the bar in 1851. Elected in 1861 a Conservative member of the Canada Legislative Assembly, he strongly supported the movement for the confederation of the British-American provinces (1862–66). In 1867 he was elected to the first Dominion Parliament and in 1869 was appointed Minister of Inland Revenue in the first administration of Sir John A. Macdonald. He was made Chief Justice of the Court of Queen's Bench of Manitoba in 1872, but in December of the same year he resigned and became Lieutenant Governor of Manitoba and the Northwest Territories (1872–76). He returned to Ontario in 1877 and was a member of the Ontario Legislature (1878–86). He published: *Canada and her Resources* (1855); *Treaties of Canada with the Indians of the North-West* (1880); *Nova Britannia* (1884), a volume of speeches and lectures on Confederation.

MORRIS, BENJAMIN WISTAR (1819–1906). An American Protestant Episcopal clergyman. He was born at Wellsboro, Pa., graduated from the General Theological Seminary in 1846, and in 1847 was ordained priest. He was stationed as rector at Sunbury, Manayunk, and Germantown, all in Pennsylvania. In 1868 he was consecrated Bishop of Oregon and Washington, his diocese subsequently being restricted to the former State. During his incumbency he actively advanced the educational and philanthropical interests of his diocese, being instrumental in establishing St. Helen's Hall, a boarding and day school for girls, the Bishop Scott Academy, and the Good Samaritan Hospital in Portland. He published *Presbyterian, Baptist, and Methodist Testimony to Confirmation* (1860).

MORRIS, CHARLES (1745–1838). An English song writer of Welsh origin. He was reared by his mother, went to America in the Seventeenth Foot in 1764, and on his return to England he was for many years punch maker and bard of the famous Beefsteak Society, a convivial club founded in 1735. He associated with the party of Fox, for which he wrote many political songs, as "Billy Pitt and the Farmer." Neglected by his Whig friends, he composed the lament, "The Old Whig Poet to his Buff Waistcoat." Morris met the Prince of Wales and was a frequent guest at Carlton House, where he was known as "the sun of the table." Among his best-known pieces are: "The Town and the Country," "A Reason Fair to Fill my Glass," "The Triumph of Venus," and "Ad Poculum." The Prince granted him an annuity of £200, and the Beefsteak Society gave him a villa near Dorking, where he passed his last years, living

to be 93. His songs were gathered under the title *Lyra Urbanica* (1840; 2d ed., 1844).

MORRIS, CHARLES (1784–1856). An American naval officer, born at Woodstock, Conn. He entered the United States navy as a midshipman in 1799 and took an active part in the operations against Tripoli. In the famous recapture and destruction of the *Philadelphia* young Morris was the first of the boarders to reach the deck of that vessel. In 1807 he was promoted lieutenant and in 1811 became first lieutenant of the *Constitution*. Morris was given great credit for his work in the escape of the *Constitution* from a British squadron, and a month later he particularly distinguished himself in the capture of the British frigate *Guerrière* and was dangerously wounded. Promoted captain, he was given command of the new sloop of war *Adams*, 28 guns. After a successful cruise in which he captured a number of merchantmen and boldly chased others into British ports, he was in turn chased by British frigates of superior force. Forced into the Penobscot, he was blockaded by a British squadron. While damages were being repaired the *Adams* was attacked by a strong British force and to save her from capture she was destroyed. In 1815 Morris commanded the frigate *Congress* in the second squadron sent against Algiers, but these vessels arrived too late to take part in active operations. In 1816 he was ordered to proceed to Oregon in the *Congress* and take possession of the country about the Columbia River; but before starting his destination was changed to the Gulf of Mexico, the Spanish colonies of Central and South America being then in a state of revolution. After Commodore Perry's death in 1819 Morris succeeded him in the command of the South American squadron. In 1825 he carried Lafayette back to France in the *Brandywine*. For 13 years he was one of the navy commissioners, and for a considerable time superintendent of the Naval Academy. At the time of his death in 1856 he was chief of the Bureau of Ordnance and Hydrography. Commodore Morris was a most distinguished, brave, able, and energetic officer and by his work and example did much to build up the navy and infuse into it an unconquerable spirit. Consult his *Autobiography* (Annapolis, 1880).

MORRIS, CHARLES D'URBAN (1827–86). An American classical scholar and educator, born at Charmouth, Dorset, England. His grandmother was Mary Philipse Morris (q.v.). He was educated at Worcester College, Oxford, and, after three years as a scholar at Lincoln College, was a fellow of Oriel (1851–54). In 1853 he came to New York, was rector of Trinity School until 1856, and then founded the Mohegan School, near Peekskill. From the University of the City of New York he went in 1876 to Johns Hopkins as collegiate professor of Latin and Greek. His publications, which are marked by many original pedagogical methods, include: *A Compendious Grammar of Attic Greek* (1869; 4th ed., 1876); a *Latin Grammar* (1870; 4th ed., 1876); an edition of Thucydides, book i (completed by J. W. White, Boston, 1887); papers in learned periodicals; and several Latin and Greek primers and readers.

MORRIS, CLARA (1849–). An American actress, especially noted for her success in the interpretation of emotional rôles. She was born in Toronto, Canada (her real name being Morrison), but was reared in Cleveland, Ohio, where at the Academy of Music she became a member of the ballet and afterward leading actress. Later she played in Cincinnati. She went to New York in 1870 as a member of Daly's company. In 1872 she made a sensation in *L'Article 47*. Conspicuous among her subsequent successes were those won in *Alixe* (1873), *Camille* (1874), and *Miss Multon* (1876). Miss Morris became known as an actress distinguished for spontaneity and naturalness. She was married to F. C. Harriott in 1874. For some years after 1885 she devoted herself mainly to literary work, writing: *Little Jim Crow, and Other Stories of Children* (1899); *A Silent Singer* (1899); *Life on the Stage: My Personal Experiences and Recollections* (1901); *A Pasteboard Crown* (1902); *Stage Confidences* (1902); *The Trouble Woman* (1904), fiction; *The Life of a Star* (1906); *Left in Charge* (1907); *New East Lynne* (1908); *A Strange Surprise* (1910); *Dressing Room Receptions* (1911). Miss Morris's old age was embittered by poverty and the complete blindness which overtook her in 1910. In 1913, the house in which she had lived in Yonkers for 37 years having been sold, she moved to Whitestone, L. I. Consult McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896); Matthews and Hutton, *Actors and Actresses of Great Britain and the United States* (ib., 1886).

MORRIS, SIR DANIEL (1844–). A British agriculturist, born at Loughor, Glamorgan, Wales, and educated at Cheltenham, the Royal College of Science, South Kensington, and Trinity College, Dublin. In 1877 he was appointed assistant director of the Royal Botanic Gardens, Ceylon, and in 1879 director of the Botanic Department of Jamaica. He was assistant director of the Royal Botanic Gardens, Kew, England, from 1886 to 1898, during which time he visited the West Indies and other colonies on several special missions connected with the improvement of their agriculture. While Imperial Commissioner of the West Indian Department of Agriculture (1898–1908) he was active in inaugurating agricultural reforms. Among the successful enterprises undertaken by him was the reëstablishment of the cultivation of Sea Island cotton in the West Indies. After his retirement from active duty he served as scientific adviser in tropical agriculture to the Colonial Office. Morris published numerous papers on horticulture, economic botany, and agriculture, especially as related to the West Indies. From 1899 to 1908 he was editor of the *West Indian Bulletin*, the *Quarterly Journal of the Imperial Department of Agriculture*, and from 1902 to 1908 of the *Agricultural News*, Barbados. In 1893 he was made C.M.G. and in 1903 K.C.M.G., and he received the Victoria medal of horticulture.

MORRIS, DINAH. In George Eliot's *Adam Bede*, the character which really becomes the centre of interest for the novel.

MORRIS, EDWARD JOY (1815–81). An American legislator, diplomat, and author, born in Philadelphia. He graduated at Harvard in 1836 and began the practice of the law in Philadelphia. He was a member of the Pennsylvania State Assembly in 1841–43, and in November, 1842, was elected as a Whig to the Twenty-eighth Congress, serving from 1843 to 1845. From 1850 to 1854 he was chargé d'affaires for the United States at Naples. After his return he took a leading part in the movement for the or-

ganization of the Republican party in Pennsylvania, and in 1856–58 was a Republican member of Congress. From 1858 to 1870 he was United States Minister to Turkey. He was a frequent contributor to American magazines for many years, and published *Notes of a Tour through Turkey, Greece, Egypt, and Arabia Petræa to the Holy Land* (2 vols., 1842). He translated, with copious notes and additions, *The Turkish Empire, Social and Political* (1854), from the German of Alfred de Besse. He also translated Theodore Mügge's *Afraja, or Life and Love in Norway* (1854), and Ferdinand Gregorovius' *Corsica, Picturesque, Historical, and Social* (1856).

MORRIS, Edward Parmelee (1853–). An American Latinist. He was born at Auburn, N. Y., graduated at Yale in 1874, and afterward studied at the universities of Leipzig and Jena. He was professor of Greek at Drury College (1879–84) and professor of Latin at Williams (1885–91), and after 1891 professor of Latin at Yale. He was editor of Plautus's *Mostellaria* (1880), *Pseudolus* (1890), and *Captives* and *Trinummus* (1898), and of Horace's *Satires* (1909) and *Epistles* (1911). He wrote also various philological monographs and reviews, especially in connection with Plautus and Latin syntax, and the important volume *On Principles and Methods in Latin Syntax* (1902).

MORRIS, Sir Edward Patrick (1859–). A Newfoundland lawyer and statesman, born at St. John's, and educated at the University of Ottawa. He was called to the bar and entered politics in 1885, being elected a Liberal member of the Newfoundland Legislature. He became a member of the cabinet of Sir William Whiteway in 1889, and was acting Attorney-General during the greater part of 1890–95. During the popular agitation for a law ratifying the railway contract undertaken by Sir Robert Gillespie Reid (q.v.), Morris headed an Independent Liberal movement (1898–1900) favoring the contract. In 1903–07 he was Minister of Justice and Attorney-General in the cabinet of Sir Robert Bond (q.v.); in 1907–09 leader of the Liberal Opposition; and then became Premier of Newfoundland. He was a delegate to the conference at Ottawa to discuss the entrance of Newfoundland into the Dominion of Canada (1895); to the British Colonial Office respecting the French shore question (1897 and 1901); to the Imperial Defense Conference, London (1909), the Imperial Conference (1911), and The Hague Arbitration Tribunal (1910). In 1904 he was knighted and in 1911 was made a member of the Imperial Privy Council. He edited the *Newfoundland Law Reports, 1800–1904* (St. John's, 1905), known as *Morris' Reports.*

MORRIS, George Pope (1802–64). An American journalist and poet, born in Philadelphia. He founded with Samuel Woodworth (q.v.) in New York the *Mirror* (1823–42), a literary weekly, which became the *New Mirror*, and the *Evening Mirror.* In these journals appeared much early work of Bryant, Halleck, Poe, Paulding, Willis, Hoffman, and others, making these periodicals important elements in the literary development of the time. Morris also founded the *National Press* (1845), out of which was developed the *Home Journal* (1846), in which Willis, who had long been associated with Morris, again collaborated. His *Briarcliff* (1825), founded on Revolutionary incidents and events, was a popular success. His *Poems*, collected for the last time in 1860, contained the familiar ballads, "Woodman, Spare that Tree" (founded on a real incident), "My Mother's Bible," "We Were Boys Together," and "A Long Time Ago." Morris died in New York, July 6, 1864. Consult J. G. Wilson, *Bryant and his Friends* (New York, 1886).

MORRIS, George Sylvester (1840–89). An American educator and philosophical writer, born at Norwich, Vt. He graduated in 1861 at Dartmouth College, served in the Federal army during the first two years of the Civil War, and was a tutor at Dartmouth in 1863–64. After spending several years in Germany in the study of philosophy and theology, he was appointed, in 1870, professor of modern languages and literature in the University of Michigan, and in 1881–89 was professor of logic, ethics, and the history of philosophy. From 1878 to 1885 he also lectured on ethics and the history of philosophy at Johns Hopkins University. He published: a translation of Ueberweg's *History of Philosophy* (2 vols., 1872–74); an edition of Gregg's *Philosophical Classics* (1875); *British Thought and Thinkers* (1880); *Kant's Critique of Pure Reason: A Critical Exposition* (1882); *Philosophy and Christianity* (1883); *Hegel's Philosophy of the State and of History* (1887).

MORRIS, George Upham (1830–75). An American naval officer, born in Massachusetts. He entered the navy in 1846, was commissioned lieutenant in 1855, and still held that rank when Commander William Radford's absence on March 8, 1862, left him the senior officer on the *Cumberland* during its battle with the Confederate ram *Merrimac.* Lieutenant Morris's gallantry in fighting his ship until she sank with her flags still flying aroused the greatest enthusiasm in the North, and earned his promotion to the grade of lieutenant commander (1862). In May, 1862, when commanding the *Port Royal*, a steam gunboat, he participated in a battle with a nine-gun Confederate battery on the James River, and was afterward wounded in an attack on Fort Darling. He also took part in the attack on Fort Powell, Grant's Pass (1864). He was commissioned commander in 1866, and in 1874 retired from active service on account of ill health.

MORRIS, Gouverneur (1752–1816). An American statesman and diplomat. He was born at Morrisania, N. Y., Jan. 31, 1752, and graduated at King's (now Columbia) College in 1768. He studied law and was admitted to the bar in 1771. In 1775 he was chosen to represent Westchester County in the first Provincial Congress of New York, and took a prominent part in the advocacy of the American cause. He served in two succeeding Congresses in the same and the following year. He was one of the recognized leaders of the congresses; served on nearly all the important committees, among them the committee that drafted the constitution of the State of New York; and with Jay and Livingston had much to do with framing the plan of government for the State. In 1777, when only 25 years of age, he was elected to the Continental Congress, in which he served until 1780. Immediately upon taking his seat he was appointed on a committee to investigate the condition of the army at Valley Forge, and afterward devoted his energies to securing the adoption by Congress of Washington's plans for the organization and pay of the army. His

ability won for him the chairmanship of the committee to confer with the British commissioners on reconciliation who arrived in 1778. As chairman of the committee to publish an address to the people of the Colonies on the existing condition of affairs he drew up a masterly account of the causes of the war, the efforts that had been made to achieve independence, and the transactions with the British commissioners. The address was entitled *Observations on the American Revolution.* In 1779 he was chairman of three other important committees and performed the whole duties of each. During his career in Congress Morris drew up several reports and papers on finance which showed marked ability. His services were recognized by his appointment as assistant superintendent of finance in 1781, a position which he held with great credit until 1785. It was in this capacity that he drew up a scheme for a system of coinage which, though not adopted at the time, ultimately became the basis of the present system. He represented Pennsylvania in the Constitutional Convention of 1787 at Philadelphia, took a leading part in the debates of that body, and the published proceedings showed that he made more speeches than any other member, always championing a strong national government. He urged the proportional representation of the States in the Senate, and favored a freehold suffrage, a good-behavior tenure for the executive, and representation in Congress apportioned according to the number of free inhabitants. In 1789 Morris went to France on private business, and was in Paris at the outbreak of the French Revolution. He kept a diary during his stay, and wrote letters which threw much light on the character of the events which he witnessed. In 1790 he went to London as private agent to the British government to conduct negotiations regarding the unfulfilled stipulations of the Treaty of 1783. His mission was not successful, and he again returned to the Continent. In 1792, while still in Europe, he was appointed Minister to France, and served in that capacity during the stormy scenes of the two ensuing years. In 1794 the French government requested and obtained his recall. He remained in Europe until 1798. In 1800 he was elected from New York to the United States Senate, where he acted with the Federalists. After his retirement from the Senate in 1803 he took great interest in the Erie Canal project, and served as chairman of the Canal Commission from 1810 to the time of his death, which occurred Nov. 6, 1816. His biography has been written for the "American Statesmen Series" by Theodore Roosevelt (Boston, 1900). An elaborate biography was prepared by Jared Sparks (3 vols., Boston, 1832). Morris's diary and letters have been published in two volumes (New York, 1888). Consult also H. C. Lodge, in *Historical and Political Essays* (Boston, 1892).

MORRIS, Gouverneur (1876–). An American novelist and short-story writer, born in New York City and educated at Yale (B.A., 1898). He began as a contributor of fiction to magazines, and so continued, writing also: *A Bunch of Grapes* (1897); *Tom Beauling* (1901); *Aladdin O'Brien* (1902); *The Pagan's Progress* (1904); *Ellen and her Man* (1904); *The Footprint and Other Stories* (1908); *Putting on the Screws* (1909); *Spread Eagle and Other Stories* (1910); *The Voice in the Rice* (1910); *It and Other Stories* (1912); *If You Touch them they Vanish* (1913); *The Incandescent Lily and Other Stories* (1914).

MORRIS, Sir Henry (1844–). An English physician, born at Petworth, Sussex. He was educated at Epsom College, University College, and Guy's Hospital and established himself in London. He served as surgeon and lecturer in anatomy and surgery at Middlesex Hospital Medical College, examiner in surgery, University of London, examiner in anatomy, University of Durham, chairman of the court of examiners, Royal College of Surgeons, president of the Royal College of Surgeons (1906–09), president of the Royal Society of Medicine (1910–12), etc. In 1909 he was made Baronet. Among his writings are: *Anatomy of the Joints of Man* (1879); *Surgical Diseases of the Kidney* (1885); *Gynecology* (1891); *Injuries and Diseases of the Genital and Urinary Organs* (1895); *On the Origin and Progress of Renal Surgery* (1898); *Treatise on Human Anatomy* (1898; 4th ed., 1907), with others; *On Treatment of Inoperable Cancer* (1902); *Looking Back—Christian Science Refuted* (1909); *"Suggestion" in Relation to the Treatment of Disease* (1910).

MORRIS, Henry W. (1806–63). An American naval officer. He was born in New York City, entered the United States navy in 1819, and became a captain in 1856. For some time after the outbreak of the Civil War he was in Washington superintending the construction of the *Pensacola,* which vessel, when completed in January, 1862, he took safely by the Confederate batteries on the Potomac. He then joined the Federal blockading squadron in the Gulf of Mexico, distinguishing himself in the attacks upon Forts Jackson and St. Philip, and after the capture of New Orleans was in command for a short time of the squadron stationed there. He was made commander in July, 1862. His health giving way, he went to New York, where soon afterward he died.

MORRIS, James. See Morris, William (1786–1858).

MORRIS, John (1826–93). An English Jesuit, born at Ootacamund, Madras, India. He went to England, studied at Harrow and at Trinity College, Cambridge; but after a year (1845–46), having become a Catholic, he went to Rome to complete his training there in the English College. He was made canon of Northampton in 1852, and from that year to 1855 was vice rector of the English College at Rome. Again returning to England, he acted as private secretary to Cardinal Wiseman and his successor, Cardinal Manning. In 1867 he became a member of the Society of Jesus. Morris was rector of St. Ignatius' College, Malta (1877–78); professor of canon law and Church history in St. Bruno's College, near St. Asaph (1879), and from 1880 to 1886 rector and master of novices at Roehampton. His principal published works are: *Condition of Catholics under James I* (1871); *The Troubles of our Catholic Forefathers* (1875); *The Letter-Books of Sir Amias Paulet* (1874); *Cardinal Wiseman's Last Illness* (1871); *The Life of Father John Gerard* (3d ed., 1881); *The Life and Martyrdom of St. Thomas Becket* (2d ed., 1885). Consult J. H. Pollen, *Life and Letters of Father John Morris* (London, 1896).

MORRIS, John Gottlieb (1803–95). An American clergyman, born at York, Pa. He graduated at Dickinson College in 1823, then

studied theology at Princeton and at Gettysburg Seminary, and in 1827 was licensed as a preacher. In the same year he went to Baltimore, where he founded the Trinity English Lutheran Church, of which he continued to be pastor until 1860, when he became librarian of the Peabody Institute. In 1860 to 1864 he was librarian of the Peabody Institute at Baltimore. In 1864 he became pastor of the Third English Lutheran Church, and in 1874 accepted a call to Lutherville, Md., where he was actively interested in the founding of the College for Women. He was president, in 1877, of the first Lutheran church diet at Philadelphia. He held a number of academic positions, founded the Lutheran Historical Society at Gettysburg, Pa., presided over the General Synod in 1843 and in 1883, contributed frequently to scientific and religious journals, edited the *Lutheran Observer* (1823–34), and wrote a number of books, among which may be mentioned *Life of John Arndt* (1853); *Life of Catherine de Bora* (1856); *Quaint Sayings and Doings Concerning Luther* (1859); *Fifty Years in the Lutheran Ministry* (1878).

MORRIS, Lewis (1671–1746). An American Colonial Governor. He was born at Morrisania, N. Y., the son of Richard Morris, a captain in Cromwell's army, who had emigrated to the West Indies after the Restoration and a few years later purchased a tract of 500 acres of land on the north bank of the Harlem River, in the region later named Morrisania, after his family. Although left an orphan in infancy Lewis was well educated under the direction of his uncle, by whom the Morrisania estate to which he fell sole heir in 1691 was increased to nearly 3000 acres. He also inherited a large estate in New Jersey, in which Colony he was appointed, in 1692, judge of the court of common right. After the union of East and West Jersey and the establishment of New Jersey as a royal colony, he was continually prominent in public affairs, serving for many years in both the Colonial Council and the Assembly. He served for a time as Chief Justice of both New Jersey and New York, was appointed acting Governor of New Jersey in 1731, and from 1738 until his death was Governor of the Colony. Consult W. W. Spooner, *Historic Families of America* (New York, 1907).

MORRIS, Lewis (1726–98). An American patriot during the Revolutionary War and one of the signers of the Declaration of Independence. He was born at Morrisania, N. Y., graduated at Yale in 1746, and as early as 1767 became conspicuous as an opponent of the restrictive measures of the British ministry. He was elected to the Continental Congress in 1775, and at the close of the session was sent west to secure, if possible, the adherence of the Indians, remaining for some time at Pittsburgh and corresponding with Congress. In 1776 he again sat in Congress, did important work on committees, and was one of the signers of the Declaration of Independence. His disinterested support of the American cause and his sturdy independence brought upon him the destruction of much of his property by the British army. Giving up his seat in 1777 in favor of his half brother, Gouverneur Morris (q.v.), he returned to his estate, and subsequently served as a member of the New York Legislature and as major general of the State militia.

MORRIS, Sir Lewis (1833–1907). An English poet, born at Carmarthen, Wales. After graduating from Jesus College, Oxford (B.A. 1855; M.A. 1858), he studied law, was called to the bar at Lincoln's Inn (1861), and practiced as a conveyancer till 1880. Especially interested in higher education in Wales, he served on the governing boards of three Welsh colleges. On several occasions he stood for Parliament in the Liberal interest, but without success. In 1895 he was knighted. His verse comprises *Songs of Two Worlds* (3 vols., 1871, 1874, 1875), sonorous and optimistic verse; the *Epic of Hades* (1877), blank-verse monologues; *Gwen: A Drama in Monologue* (1879); the *Ode of Life* (1880); *Songs Unsung* (1883), the first volume to be issued under the author's own name; *Gycia: A Drama* (1886); *Songs of Britain* (1887); *A Vision of Saints* (1890); *Songs without Notes* (1894); *Idylls and Lyrics* (1896); *Harvest-Tide* (1901); *The New Rambler from Desk to Platform* (1905). To the critic Morris is a writer of slight and easy verse on pretentious themes.

MORRIS, Mary (Philipse) (1730–1825). One of the celebrated Philipse family, born in the Philipse manor house on the Hudson. She possessed much personal beauty and charm, and, according to an insufficiently supported tradition, she received and declined an offer of marriage from Washington, whom she met in 1756 while visiting her brother-in-law Beverly Robinson in New York. Two years later she married Capt. Roger Morris, an English officer, and lived for many years in an elegant mansion—known as the Roger Morris House and later as the Jumel mansion—on the outskirts of New York. When the Revolution broke out she remained loyal to the crown, and as a result she was attainted of treason and in 1776 her property was confiscated. In 1809 her children sold their reversionary rights in the confiscated property to John Jacob Astor for $100,000. In recognition of her loyalty, the English government made her a grant of $85,000. Mrs. Morris accompanied her husband to England and died at York. Her mansion was Washington's headquarters from Sept. 16 to Oct. 21, 1776. Here he made plans to defend the Heights and to block the passage of the Hudson River. The house was purchased in 1810 by Stephen Jumel, a French wine merchant, and for some time was the resort of French émigrés. Jumel's widow occupied the house until her death in 1865, and for many years thereafter Nelson Chase, the husband of Mme. Jumel's niece, lived there. In 1903 it was acquired by New York City to be used as a museum of historic relics.

MORRIS, May (?–). An English worker in arts and crafts, daughter of William Morris (1834–96). She was born at Upton, Kent, attended Notting Hill High School, and studied art with her father. She devoted herself to the designing of embroidery and jewelry and later lectured widely on these and similar subjects in England and America. Miss Morris was one of the founders and later became chairman of the Women's Guild of Arts. She edited, with introductions, her father's collected works (24 vols., 1910–14).

MORRIS, Michael, Baron Killanin (1827–1901). An Irish jurist. He was born in Galway, studied at Trinity College, Dublin, and was called to the Irish bar in 1849. His great popularity made his advance in politics very rapid. He was elected to the House of Com-

mons in 1865 as a Conservative; was named Solicitor-General for Ireland in 1866, Attorney-General in the same year, a puisne judge of the Irish Court of Common Pleas in the following year; and after the abolition of his later post of Chief Justice of Common Pleas, he became Lord Chief Justice of Ireland in 1887. His great popularity was due to a kindly nature, a contempt for legal subtleties and technicalities, and an abounding wit whose expression was flavored with a rich Galway brogue. When asked once at a London dinner party to explain Irish disaffection, he replied that it was a case of "a quick-witted people ruled against its will by a stupid people"—an epigram that has become historic. In 1900 Morris retired from the bench, and the same year was made an hereditary baron in the peerage of the United Kingdom.

MORRIS, Richard (1833–94). An English philologist. He was born at Bermondsey, was educated at St. John's College, Battersea, in 1869 became lecturer on the English language and literature in King's College School, and in 1871 took holy orders. Four years later he was made headmaster of the Royal Masonic Institution for Boys at Wood Green, Middlesex, from which he retired in 1888 to become master of the grammar school of Dedham, Essex. He edited a number of publications for the Early English Text Society, the Chaucer Society (notably his *Chaucer* in six volumes, 2d ed., 1891), and the Philological Society; and in 1874 was elected president of the latter. Besides his editions of early English works, he published: *The Etymology of Local Names* (1857); *Specimens of Early English* (1867); *Historical Outlines of English Accidence* (1872; 2d ed. by Kellner and Bradley, 1895); *Elementary Lessons in Historical English Grammar* (1874); *Primer of English Grammar* (1874). From 1882 to 1888 he turned his attention to Pali and edited four of the extensive Buddhist texts for the Pali Text Society.

MORRIS, Robert (1734–1806). An eminent American financier and one of the signers of the Declaration of Independence. He was born at Liverpool, England, Jan. 31, 1734. At the age of 14 he was sent to America and placed in the counting house of Charles Willing, a rich Philadelphia merchant, whose partner he became in 1754, continuing as such until 1793. The firm of Willing & Morris became one of the leading mercantile establishments in America, and by the outbreak of the Revolutionary War Morris had already acquired a large fortune. Although naturally averse to a rupture with Great Britain, he sacrificed his personal interests, signed the nonimportation agreement of 1765, and served as a member of the citizens' committee that compelled the stamp distributor for Philadelphia practically to relinquish his office. In June, 1775, he became a member of the Pennsylvania Committee of Safety; in October of the same year he was elected to a seat in the Legislature of Pennsylvania (to which he was reëlected in 1776), and in November he was appointed by that body a delegate to the Continental Congress. All three of these offices were held by him at the same time. As a member of Congress he served on several important committees and signed the Declaration of Independence, although he had opposed Lee's resolution of June 7 and absented himself from the congressional hall on July 4, when the final vote was taken. At the expiration of his term in Congress, in 1778, he was elected again to the State Legislature, but on account of miscellaneous charges against him in connection with his mercantile operations, he failed of reëlection in the following year. In October, 1780, however, he was returned to the Legislature for the fourth time. It was at this time that the fortunes of the Colonial army reached their lowest ebb. Charleston had fallen; Gates had been defeated by Cornwallis; Arnold's treachery cast gloom on the country. Munitions and supplies were sadly wanting, and Continental currency had depreciated until it was worth but little more than the paper on which it was printed. In this almost desperate situation, Congress resolved to supersede the old treasury board by a superintendent of finance. Morris was chosen to the position Feb. 20, 1781, at a salary of $6000 a year, and received large powers over the finances of the Confederation. His chief programme was to relieve the situation by import duties, loans and subsidies from France, and to inaugurate a policy of retrenchment. He was unable, however, to carry out the first part of his scheme on account of the refusal of the States to confer the necessary power upon Congress for the laying of import duties. On several occasions he succeeded in borrowing large sums on his personal credit, without which some of the important campaigns of the war would have been impossible. Thus the means which enabled Washington and Greene to carry out the campaign of 1781 were raised mainly by his exertions. In 1781, with the approval of Congress, he founded the Bank of North America and became a large stockholder in it. This institution became of great service to the American cause and was, to a certain extent, under the control of Morris. He continued to hold the difficult and vexatious office of Superintendent of Finance until November, 1784, when he resigned it with a sense of relief. In the same year the Pennsylvania Legislature had annulled the charter of the bank, and in order to obtain its reëstablishment Morris secured an election to the Legislature in 1785 and succeeded in having the charter renewed in 1786. In the latter year he was again elected to the Legislature, and in 1787 became a member of the Constitutional Convention at Philadelphia. He had the honor to nominate Washington for the presidency of the Convention, but did not take a prominent part in the proceedings of that body. Upon the organization of the new government, President Washington offered him the position of Secretary of the Treasury. He declined the offer and recommended Alexander Hamilton, who was appointed. At the same time, however, he accepted a seat in the United States Senate, where he served without special distinction until 1795. Unfortunate business speculations proved disastrous, and on Feb. 16, 1798, he entered a debtor's prison in Philadelphia, where he was confined until Aug. 26, 1801. He died May 8, 1806. Consult: A. S. Bolles, *The Financial Administration of Robert Morris* (New York, 1878); W. G. Sumner, *The Financier and the Finances of the American Revolution* (ib., 1891); id., *Robert Morris* (ib., 1892). The best biography is E. P. Oberholtzer, *Robert Morris, Patriot and Financier* (New York, 1903), which is based upon the Robert Morris papers in the Library of Congress.

MORRIS, Thomas (1776–1844). An American antislavery leader, born in Augusta Co.,

Va. His father removed to Ohio in 1795. While working on a farm in Clermont County he studied law, and was admitted to the bar in 1804. From 1806 to 1830 he was a member of the Ohio State Legislature. In 1832 he was elected to the United States Senate as a Democrat. He very soon took ground on the slavery question, however, in radical opposition to that held by the majority of his party. He willingly presented antislavery petitions and ardently defended the right of petition in the Senate. He also spoke strongly against Texan annexation. In 1838, when Calhoun introduced a series of resolutions touching the constitutional status of slavery, Morris introduced a set of alternative resolutions embodying a rational and explicit statement of the views of the antislavery men. On the expiration of his term as Senator his constituents, to whom his views on the slavery question had been displeasing in the extreme, discarded him for Benjamin Tappan. In January, 1840, at the Democratic State Convention, he was read out of the party, and later in the year associated himself politically with the new Liberty party (q.v.) movement. In May, 1841, he was nominated for Vice President on the Liberty party ticket, on which James G. Birney had been named for President. These nominations, which were for the campaign of 1844, were confirmed at the Buffalo convention of the party in 1843. Consult B. F. Morris, *Life of Thomas Morris* (Cincinnati, 1856), and Smith, *The Liberty and Free-Soil Parties in the Northwest* (New York, 1897).

MORRIS, Thomas Asbury (1794–1874). An American Methodist Episcopal bishop, born near Charleston, W. Va. His educational advantages were limited. He was originally of Baptist training, but entered the Methodist ministry in 1816. From 1834 to 1836 he was editor of the *Western Christian Advocate.* Elected Bishop in 1836, for several years he was the senior Bishop of the church. He was a member of the General Conferences of 1824, 1828, 1832, and 1836. His writings include: *A Discourse on Methodist Church Polity* (1859; later eds.); *Sermons on Various Subjects* (1841, 1859); *Miscellany, Essays, Sketches, etc.* (1854); *A Semi-Centennial Sermon* (1864). Consult J. F. Marlay, *The Life of Thomas A. Morris* (New York, 1875).

MORRIS, William (1786–1858). A Canadian statesman. He was born at Paisley, Scotland, was brought by his parents to Lower Canada (Quebec) in 1801, and a few years later entered business in Montreal. During the War of 1812–15 he served both in the militia and in the navy, and shortly after peace was signed resumed business at Perth. He was a member of the Upper Canada Assembly (1820–36), and in the former year became prominent by moving and carrying a series of resolutions claiming for the clergy of the Church of Scotland a share in the lands reserved by law for the use of the Protestant clergy, but hitherto monopolized by the Church of England. His name thereafter was prominently identified with the struggle for the secularization of the clergy reserves. He was selected in that behalf to be the bearer of a petition to the British government, and in 1837 went to England for that purpose. Morris was appointed a member of the Legislative Council in 1836. During the rebellion of 1837–38 in Upper Canada he served the government as colonel of militia. In 1844 he was appointed Receiver General in the administration of which William Henry Draper (q.v.) was the chief figure. In 1846 he became President of the Executive Council, retaining that office in the succeeding Sherwood-Daly ministry (1847–48).

His brother, James Morris (1798–1865), was elected to the Upper Canada Assembly in 1837 and to the Canada Legislative Assembly in 1841. He was appointed to the Legislative Council in 1844, was Postmaster-General in the Hincks-Morin administration (1851), Speaker of the Legislative Assembly (1853–54), Speaker of the Legislative Council (1858), and Receiver General in the Macdonald-Sicotte administration (1862–63).

MORRIS, William (1834–96). An English poet, artist, and Socialist. He was born at Walthamstow near London, March 24, 1834. Morris's early boyhood was spent in the romantic region near Epping Forest, where he showed at the outset his love for nature. He was educated at Marlborough College, and at Exeter College, Oxford. Here he mingled little in the college life, but he read swiftly and widely, thus quickly storing in his strong memory a stock of knowledge which he put to use. In 1854 he was near turning to Roman Catholicism as an escape from religious perplexities, but the impulse passed. He mastered Church history and Anglican theology, but soon left them in a new enthusiasm for Carlyle, Ruskin, and Kingsley. It was in 1854 that Morris first visited France, whither he went again a year later with his friend Edward Burne-Jones (q.v.). On this tour he fell so wholly under the spell of French Gothic that he gave up his earlier purpose of founding a religious brotherhood and became an architect. In 1859 he married Jane Burden of Oxford, who had sat as his model and was a noted beauty. After trying his hand at architecture and painting, Morris with Rossetti, Burne-Jones, and other friends, established, in 1861, a firm in London for designing and manufacturing artistic furniture and household decorations. As time went on Morris took up the manufacture of tapestry and other textiles, dyeing, book illumination, and printing. The old firm of decorative art was dissolved in 1875, and in 1881 Morris transferred his works to Merton Abbey in Surrey. In 1890 he founded the famous Kelmscott Press at Hammersmith. There many beautiful books were printed, and thence, after 1893, he issued books of his own in verse and prose. For the practical advancement of the lesser arts, and of the doctrine that all things should be made beautiful, Morris did more than any other man of his time. At Oxford he showed his literary talent in several contributions in verse and prose to the *Oxford and Cambridge Magazine,* which he maintained (1856). Two years later he published the *Defense of Guenevere, and Other Poems.* This volume marks a date in later romanticism; and never again did Morris surpass it in force and concentration. Afterward he turned for his subjects to Roman, Greek, Norse, Old French, and other mediæval stories, which he clothed in verse with great facility. By the *Life and Death of Jason* (1867) and *The Earthly Paradise* (1868–70) he proved himself one of the best story-tellers since Chaucer, his avowed master. In the summer of 1871 he made a trip through Iceland. In 1876 appeared *Sigurd the Volsung and the Fall of the Niblungs,* a narrative poem approaching the dignity of an epic.

Morris wrote many romances in prose or in prose and verse combined; among these are the *House of the Wolfings* (1889), *The Roots of the Mountains* (1890), *The Story of the Glittering Plain* (1890), and *The Well at the World's End* (1896). In 1890 he published *News from Nowhere*, a romantic pastoral, picturing the England of a possible remote future, happy in a realized Socialism. As a translator he succeeded capitally in his renderings from the sagas, and his English translations of the *Æneid* and the *Odyssey* have, with their defects, fine qualities. In 1885 he became an active Socialist, delivering lectures to workmen and contributing to the *Commonweal*, the organ of the Socialistic League. He died Oct. 3, 1896, leaving to the world a splendid example of the man who devotes his wealth and his genius to the bettering of visible things and to the spreading of fine and generous ideals. A collection of various of his papers, entitled *Architecture, Industry, and Wealth*, appeared posthumously in 1903.

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MORRIS DANCE (from OF. *morisque, morésque*, Fr. *moresque*, from Sp. *morisco*, Moorish, from *moro*, Moor). An obsolete English dance of Moorish origin. It seems to have been introduced into England about the time of Edward III, but it did not become universally popular until the time of Henry VII. When danced in connection with May Day it was an elaborate costume dance, and the characters of Robin Hood, Friar Tuck, Maid Marian, Little John, a dragon, and hobbyhorse were introduced. The costumes of the performers were generally decorated with scores of small bells which were tuned in musical intervals. There were several variations of the morris dance, the two most notable being a sword dance, where the performers leaped over swords, and a ribbon dance, in which the girls danced back and forth between colored streamers. At the Restoration the morris dance was revived for a time, but soon died out. Several modern English composers have used it as an idealized dance form, generally in 4-4 time.

MORRIS ISLAND. An island at the southern entrance to the harbor of Charleston, S. C. (Map: South Carolina, E 4). Three small batteries on Cumming's Point, at the northern end of Morris Island, took part in the bombardment of Fort Sumter on April 12–13, 1861. Later the works were strengthened and called Battery Gregg, and Battery Wagner was constructed to the south. In the spring of 1863 Admiral Du Pont and General Hunter made unsuccessful attempts to reduce these defenses. When these officers were succeeded by Admiral Dahlgren and General Gilmore, early in July, a landing was effected on the southern part of the island, but on the 11th and 18th desperate assaults failed. A regular siege was established and five parallels were constructed. The guns of Fort Sumter, which were trained to protect the island, were silenced by the Federal fleet, and on September 7 General Beauregard ordered the evacuation of the island.

MOR'RISON. A city and the county seat of Whiteside Co., Ill., 124 miles west of Chicago, on the Chicago and Northwestern Railroad (Map: Illinois, D 2). It is surrounded by a region interested largely in farming, stock raising, and dairying, and manufactures refrigerators, school furniture, flour, carriages, and condensed milk; and there are two greenhouses. It has a public museum and library. Pop., 1900, 2308; 1910, 2410.

MORRISON, ARTHUR (1863–). An English novelist, widely known for the realism with which he depicts London life, and known also as a collector of objects of art and as a writer on Oriental art. A collection of paintings by Chinese and Japanese old masters, made by him, is now in the British Museum. His writings comprise: *Tales of Mean Streets* (1894); *Martin Hewitt, Investigator* (1894); *Chronicles of Martin Hewitt* (1895); *Adventures of Martin Hewitt* (1896); *The Dorrington Deed-Box* (1897); *To London Town* (1899); *Cunning Murrell* (1900); *The Hole in the Wall* (1902); *Divers Vanities* (1905); *Green Ginger* (1909); *The Painters of Japan* (1911); and the plays *That Brute Simmons* (1904), with H. C. Sargent, and *A Stroke of Business* (1907), with H. W. C. Newte.

MORRISON, FRANK (1859–). An American labor leader. He was born at Franktown, Ontario, was educated in the schools of Walkerton, Ontario, became a printer in 1873, and graduated in 1894 from the Lake Forest University Law School, where he also studied in 1895. In 1897 he became secretary of the American Federation of Labor. He was one of the three officials of the American Federation of Labor who were made defendants in the Buck Stove case. For a history of the case see MITCHELL, JOHN; and consult H. W. Laidler, *Boycotts and the Labor Struggle* (New York, 1914).

MORRISON, GEORGE ERNEST (1862–1920). A British journalist, born at Geelong, Victoria, Australia. He studied for some time at Melbourne University and completed his education at Edinburgh in 1887. In the meanwhile he had seen adventure in the South Sea islands, had crossed Australia on foot from north to south (1882–83), and had been seriously wounded in New Guinea. After further travels in America and in Morocco, where he was for some time court physician, and after a short sojourn in Australia, he went to China, walked from Shanghai to Rangoon (1894), traveled in Siam and southern China as correspondent to the London *Times* (1895–96), and in 1897 became correspondent of the *Times* at Peking, where he was present during the Boxer disturbances of 1900. His views on Chinese affairs,

gained by travel and study in every province of China, are authoritative. In 1912 he was appointed political adviser to the President of the Chinese Republic. He wrote *An Australian in China* (1895).

MORRISON, JAMES DOW (1844–). An American Protestant Episcopal bishop, born of Scottish parents in Waddington, N. Y. He received his early education in Canada, graduating from McGill University, Montreal, in 1865. He was minister at Hemmingford, Canada, in 1869–71, and later at Herkimer, N. Y., and Ogdensburg, where he was Archdeacon from 1881 until 1897. In the latter year he was consecrated first Protestant Episcopal Missionary Bishop of Duluth. In 1907 he organized the diocese of Duluth, of which he became Diocesan Bishop. In 1898 he was Paddock lecturer at the General Theological Seminary, New York. He published *Fundamental Church Principles* (1900).

MORRISON, ROBERT (1782–1834). The first Protestant missionary to China, born at Buller's Green, Morpeth, England. He learned the trade of boot-tree maker after leaving school. In 1797 he was converted, joined the Presbyterian church, and began to improve himself by study. In 1803 he was admitted to Hoxton Independent Academy, and in the following year entered the Mission College of Gosport. Morrison, having been ordained, was sent out in 1807 as the first missionary. Under the protection of some merchants from the United States settled at Canton, he assumed Chinese dress and began the study of Chinese. In 1809 he was appointed translator to the East India Company's factory here, and while in this position he prepared a *Grammar of the Chinese Language*, published in 1815. Between 1815 and 1823 appeared the six thick quarto volumes of his *Dictionary of the Chinese Language*. He also produced several vocabularies of Canton-English and English-Canton. His *New Testament* in Chinese was published in 1815, and the *Old Testament* appeared in 1818. In that year he founded the Anglo-Chinese College at Malacca. It was removed to Hongkong in 1845. Consult the *Memoir* by his widow (2 vols., London, 1839) and W. J. Townsend, *Robert Morrison, Pioneer of Chinese Missions* (New York, 1888).

MORRISON, WILLIAM (1785–1866). A Canadian explorer and fur trader, born at Montreal. He began trapping and trading at Fond du Lac in 1802, joined the Northwest Company in 1805, and made extensive explorations in the Northwest territories. After John Jacob Astor gained control in 1818 of fur trading in the United States, Morrison worked for him until 1826. He afterward returned to Lower Canada. Morrison claimed to have explored during the winter of 1803–04 Lac La Biche, or Elk Lake, which was in 1832 identified as the source of the Mississippi by Schoolcraft and renamed Itasca. Consult *Minnesota Historical Society Collections* (vol. i, St. Paul, 1872; vol. vii, Minneapolis, 1893; vol. viii, St. Paul, 1898).

MORRISON, WILLIAM RALLS (1824–1909). An American lawyer and legislator, born in Monroe Co., Ill. He was educated at McKendree College, but left before graduation to enlist as a private in an Illinois volunteer regiment for the Mexican War, and participated in most of the battles of Taylor's campaign. After his return he studied law, was admitted to the bar, and from 1855 to 1859 was a Democratic member of the Lower House of the Illinois Legislature, serving as Speaker in the last year. At the outbreak of the Civil War he organized and became colonel of the Forty-ninth Illinois Infantry, fighting at Fort Donelson and serving until December, 1863, when he resigned to take his seat as a War Democrat in the Thirty-eighth Congress; he had been elected while at the front in the preceding year. He practiced law from 1865 until 1873, and from that year until 1887 was again a member of the House. During his congressional career he attained wide distinction as an advocate of a radical reduction in the tariff, but was never able to secure the support of enough members of his own party to assure the passage of bills which as chairman of the Ways and Means Committee he introduced in 1876, 1884, and 1886. The Morrison Bill of 1884, embodying the famous "horizontal" tariff scheme, which proposed a straight (or horizontal) reduction of 20 per cent from the tariff of 1883, was defeated by a slender majority formed of Republicans and protectionist Democrats led by Samuel J. Randall (q.v.). In 1885 Morrison was defeated for election to the United States Senate by John A. Logan by one vote, and in the following year failed of reëlection to the House. He was appointed by President Cleveland a member of the Interstate Commerce Commission in 1887, and served until 1897, for the last six years as chairman.

MOR'RISTOWN. A town and the county seat of Morris Co., N. J., 22 miles by rail west of Newark, on the Delaware, Lackawanna, and Western, the Morristown and Erie, and the New Jersey and Pennsylvania railroads (Map: New Jersey, C 2). Among the features of the town are Memorial and All Souls' hospitals, Randolph Military Academy, the Young Men's Christian Association and Young Men's Catholic Association buildings, a public park with a soldiers monument, and a large public library and lyceum, occupying a handsome edifice. Here is the site of Fort Nonsense, erected by Washington and marked by a memorial monument. Four miles from the town, at Morris Plains, is the State Hospital for the Insane, which cost nearly $3,000,000, has accommodations for 1500 patients, and is one of the largest institutions of its character in the United States. Morristown is in the rose and peach belt of the State, on a table-land surrounded by hills rising nearly 700 feet above sea level, and is chiefly a fashionable residential place with large villas. The only industrial establishments of any importance are hosiery mills and a high-pressure wire factory. Its comparatively dry and bracing winter climate attracts invalids. The government, as provided under the original charter of incorporation, is vested in a mayor and a municipal council, of which the executive is a member. The school commissioners are chosen by popular vote. Pop., 1900, 11,267; 1910, 12,507; 1920, 12,548.

Settled about 1710, Morristown was known as West Hanover until in 1740 it received its present name in honor of Lewis Morris, then Governor of New Jersey. During the Revolution Washington made his headquarters here from January to May, 1777, and again from December, 1779, to June, 1780, occupying during the latter period the old Ford mansion, which now belongs to the Washington Association and in which numerous Revolutionary

relics are exhibited. At the old Speedwell Ironworks here the shaft of the *Savannah*, the first steamboat to cross the Atlantic, was cast, and here, from 1837 to 1843, Professor Morse and Alfred Vail perfected the electric telegraph. Morristown was incorporated in 1865. Consult Colles, *Authors and Writers Associated with Morristown, etc.* (Morristown, 1893), and Sherman, *Historic Morristown* (ib., 1906).

MORRISTOWN. A city and the county seat of Hamblen Co., Tenn., 42 miles northeast of Knoxville, on the Southern and the Knoxville and Bristol railroads (Map: Tennessee, G 2). It is the seat of the Morristown Normal and Industrial College, a Methodist Episcopal institution for negroes. Morristown is the commercial centre of a rich agricultural region, and is an important poultry and stock market, the value of the annual shipments being $3,000,000. The manufactures include flour, stoves, threshing machines, hosiery, butter, hardwood tops and panels, furniture, gloves, vinegar, harness and saddles, tinware, acetylene-lighting plants, monuments, concrete building blocks, wagons, leather, brooms, and sash and blinds; and there are quarries of variegated marble and zinc, lead, and iron mines in the vicinity. The city owns and operates its water works and electric-light and sewage plants. Pop., 1900, 2973; 1910, 4007.

MORRISTOWN. A town, including the village of Morrisville, Lamoille Co., Vt., 50 miles by rail east by north of Burlington, on the Lamoille River and on the St. Johnsbury and Lake Champlain Railroad (Map: Vermont, C 3). It contains a Carnegie library and the People's Academy. Morristown is in a rich agricultural and dairying country, butter, eggs, cream, potatoes, and hay being the chief products. The water works and electric-light plant are owned by the village of Morrisville. Pop., 1900, 2583; 1910, 2652.

MORRO, El. See National Monuments.

MOR'ROW, Prince Albert (1846–1912). An American dermatologist, born at Mt. Vernon, Christian Co., Ky. He graduated as M.D. from University Medical College (later part of New York University) in 1874. Settling in New York City, he was clinical professor of venereal diseases (1884–90) and clinical professor of genito-urinary diseases (1886–90) at the university and at Bellevue Hospital Medical College. He took active part in the public-welfare movement and was president of the American Society for Sanitary and Moral Prophylaxis from its organization in 1905. He contributed many articles to the medical journals and was one of the editors of the *Journal of Cutaneous and Genito-Urinary Diseases*. Among his works may be mentioned: *Venereal Memoranda* (1885; 2d ed., 1905); *Drug Eruptions* (1887); *Atlas of Skin and Venereal Diseases* (1888–89); *System of Genito-Urinary Diseases, Syphilology, and Dermatology* (3 vols., 1892–94); *Leprosy* (1899); *Social Diseases and Marriage* (1904).

MORROW, William W. (1843–). An American lawyer and jurist, born near Milton, Wayne Co., Ind., and educated in the public schools of Illinois and California. Admitted to the bar in 1869, he served as assistant United States attorney for California (1870–74), as attorney of the State Board of Harbor Commissioners (1880–83), and as special counsel for the United States before the French and American Claims Commissions (1881–83) and before the Alabama Claims Commission (1882–85). From 1879 to 1882 he was chairman of the Republican State Central Committee, in 1884 chairman of the California delegation to the Republican National Convention, and a member of the Forty-ninth to the Fifty-first Congresses (1885–91). After serving as United States district judge for the northern district of California in 1891–97, Morrow became judge of the United States Circuit Court and then of the Circuit Court of Appeals for the ninth judicial circuit. In 1905 he was one of the incorporators of the American National Red Cross Society.

MORS. The largest island in the Limfjord, in northwest Jutland, Denmark (Map: Denmark, B 2). Its area is 139 square miles. It is in marked contrast with the surrounding mainland, being much more fertile and having a somewhat elevated (250 feet) interior, with steep coasts. Pop., 1901, 22,237; 1911, 24,270. The chief town is Nykjöbing, with 6918 inhabitants (1911).

MORSE (probably from Icel. *mar*, sea + *ros*, horse, cf. Norw. *rosmar*, walrus; less plausibly from Russ. *moryŭ*, *morzhŭ*, morse, from *more*, sea). An old name for the Atlantic walrus (q.v.).

MORSE. See Costume, Ecclesiastical.

MORSE, Charles Wyman (1856–). An American financier, born in Bath, Me. He graduated from Bowdoin College in 1877, having more than paid his way through college by sending ice to a New York brewery company. Later he engaged in the shipping business in Maine, moving in 1880 to Brooklyn and then to New York City. Here he established an ice business which finally, in 1899, under the name of the American Ice Company, expanded to include the areas of Philadelphia and Baltimore. This company practically secured a monopoly in New York. Through political affiliations it obtained exclusive wharfage rights, enabling it to raise prices until the public clamor caused an investigation. The scandalous condition then revealed was regarded as one of the causes of the overthrow of Tammany Hall in 1901. In the meanwhile Morse had sold his holdings, making a profit, it was claimed, of over $12,000,000. He then turned to the shipping business. His efforts to secure a monopoly of the American coastwise transportation service resulted in the combination under one control of the Clyde Steamship Company, the Mallory line, the Metropolitan Steamship Company, the Hudson Navigation Company, the Ward line, and others. Morse also entered the publishing business and was influential in establishing the Butterick Company, of which he was first vice president. To finance his vast industrial undertakings, and especially to make possible a spectacular manipulation of American Ice, Consolidated Steamship, and United Copper stocks, he secured control of a chain of nine banks, using methods afterward considered questionable. Because of his connection with several of the banks which failed during the panic of 1907 and the general belief that in a measure Morse was responsible for the panic, his methods and transactions came up for review in the Federal courts. The National Bank of North America (New York), of which he was vice president, was closed in January, 1908. The indictment charged that he had criminally

misapplied the funds of this bank (and so of others also), that "he had entered upon a career of reckless and forbidden speculation," and that he had concealed his unlawful practices by making false entries in the books. Later in the same year he was convicted and sentenced to 15 years' penal servitude in Atlanta Penitentiary; higher courts sustained this decision. The case attracted general attention, but opinions regarding the outcome were various. Many, regarding it as a salutary lesson to those who were conducting big business illegally, rejoiced in the ability of the government to convict a rich man. Others thought that, while Morse was guilty, such actions as his were common in Wall Street and that his offense was more technical than real. The case was important in that it gave an impetus to the antitrust movement. After Morse had served a part of his sentence, his health was reported to have been undermined, and efforts were made, particularly by his wife, to obtain a pardon, which was granted by President Taft in 1912. A sojourn abroad enabled him to recuperate rapidly and he returned to the United States the next year. From then on he was involved in suits by persons who had lost on American Ice stock, etc.; but he again acquired corporate interests, becoming president of the Hudson Navigation Company.

MORSE, Edward Sylvester (1838–). An American zoölogist and Orientalist, born at Portland, Me. For three years he studied at the Lawrence Scientific School, Harvard, under Louis Agassiz. He was professor of comparative anatomy and zoölogy at Bowdoin College (1871–74), lecturer at Harvard (1872–73), and professor at the Imperial University, Tokyo, Japan (1877–80). Thereafter he served as director of the Peabody Museum at Salem, Mass., of which he had been a founder. Morse became known also as a popular lecturer on natural history and Oriental travel. His reputation as a zoölogist was early established by his studies of brachiopods, which proved them not to be mollusks, and he was elected a member of the National Academy of Sciences, also corresponding or honorary member of many foreign scientific and Oriental societies, a fellow of the American Academy of Arts and Sciences, and president of the American Association for the Advancement of Science (1886). While in Japan Morse interested himself greatly in the art, antiquities, social customs, and folklore of the people and made a collection of pottery, etc., which was bought by the Museum of Fine Arts, Boston. A catalogue, prepared by Morse, who had been made keeper of the collection in 1892, appeared in 1901. In 1898 he was decorated with the Order of the Rising Sun; as an expert on Japanese ceramics, he served on the jury of awards at the Chicago, Buffalo, and St. Louis expositions; and in 1911 he was president of the American Association of Museums. His writings include: *First Book of Zoölogy* (1875); *Japanese Homes and their Surroundings* (1886); *On the Older Forms of Terra-Cotta Roofing Tiles* (1892); *Glimpses of China and Chinese Homes* (1902); *Mars and its Mystery* (1906); besides numerous articles contributed to scientific journals.

MORSE, Harmon Northrop (1848–). An American chemist, born at Cambridge, Vt. He graduated from Amherst College in 1873 and from the University of Göttingen (Ph.D.) in 1875. He was an assistant in chemistry at Amherst in 1875–76, and at Johns Hopkins University served as associate professor of chemistry in 1876–91, as professor of analytical chemistry from 1891 to 1908, and thereafter as professor of inorganic analytical chemistry and director of the chemistry laboratory. His researches in osmotic pressure are of importance. He published *Exercises in Quantitative Chemistry* (1905) and *The Osmotic Pressure of Aqueous Solutions* (1914).

MORSE, Harry Wheeler (1873–). An American physicist, born at San Diego, Cal. He graduated at Leland Stanford Junior University in 1897 and at Leipzig (Ph.D.) in 1901. He was instructor (1902–10) and assistant professor (1910–12) in physics at Harvard University and served as professor of chemistry (1912–13) at the University of California. In 1913 he was placed in charge of the scientific work of the Western Precipitation Company at Los Angeles, Cal. He is translator of Ostwald's *Letters to a Painter on the Theory and Practice of Painting* (1906) and *Fundamental Principles of Chemistry* (1907); coauthor of *Ostwald and Morse's Elementary Modern Chemistry* (1907); and author of *Chemistry and Physics of the Lead Accumulator* (1912) and monographs on spectroscopy.

MORSE, Hosea Ballou (1855–). An American author and authority on Chinese affairs, born at Brookfield, Nova Scotia. His ancestors had settled at Dedham, Mass., as early as 1636. Graduating from Harvard in 1874, Morse entered the Chinese Imperial Customs Service as an assistant. He was made Deputy Commissioner in 1887 and Commissioner in 1896, and from 1903 till his retirement in 1907 was Statistical Secretary (Commissioner of Customs) to the Inspector General of Customs (Chief of the Department of Statistics, Printing, and Supplies). In 1885 he was sent by Imperial decree on a special mission regarding the peace settlement between China and France. From 1885 to 1887 he was also concerned with the reorganization of the China Merchants' Steam Navigation Company. In 1889, again by special Imperial decree, he was appointed Commissioner in connection with the opening of Hunan Province to foreign trade. He was highly honored by the Manchu government; became president of the American Association of China, vice president of the China branch of the Royal Asiatic Society, and chairman of the board of directors of the Y. M. C. A. at Shanghai; and received the degree of LL.D. from Western Reserve University in 1913. His writings include: *Currency of China* (1906); *Trade and Administration of the Chinese Empire* (1908; rev. ed., 1913); *Guilds of China* (1909); *International Relations of the Chinese Empire, 1834–1860* (1910).

MORSE, John Torrey (1840–). An American biographer. He graduated at Harvard College in 1860, lectured there on history (1876–79), was coeditor with Henry Cabot Lodge of the *International Review*, and practiced law in Boston. From 1879 to 1891 he was an overseer of Harvard. He was honored with membership in the National Institute of Arts and Letters. His books include: *Treatise on the Law Relating to Banks and Banking* (1870); *Law of Arbitration and Award* (1872); *Famous Trials* (1874); *Life of Alexander Hamilton* (2 vols., 1876); *Life and Letters of Oliver Wendell*

Holmes (2 vols., 1896); in "American Statesmen Series" (which was edited by him) the lives of *John Quincy Adams* (1882), *Thomas Jefferson* (1883), *John Adams* (1884), *Benjamin Franklin* (1889), and *Abraham Lincoln* (2 vols., 1893); *Life and Letters of Colonel Henry Lee* (1906).

MORSE, Richard Cary (1841–). An American leader in the Young Men's Christian Association. He was born at Hudson, N. Y., and was educated at Yale (A.B., 1862), and at Princeton and Union theological seminaries. He was assistant editor of the New York *Observer* in 1867–69, and was then ordained to the Presbyterian ministry. As general secretary of the international committee of the Y. M. C. A. after 1869, he became prominently identified with the extension and supervision of the work in North America, and after 1872, in its interest, made several trips to England, the Continent, Australia, China, Japan, Korea, and India. He was chosen one of the two American members of the World's Student Christian Federation. His writings include: *Robert R. McBurney: A Memorial* (1899); *Polity of Young Men's Christian Associations* (1904); *Fifty Years of Federation of the Young Men's Christian Associations of North America* (1905); *History of the North American Young Men's Christian Associations* (1913).

MORSE, Samuel Finley Breese (1791–1872). An American artist and inventor. He was born at Charlestown, Mass., April 27, 1791, and graduated at Yale College in 1810. While in college he painted "miniatures on ivory at $5 and profiles at $1." Later, with the American painter Washington Allston, he visited England and studied there with Allston and with Benjamin West. In 1813 he received the gold medal of the Adelphi Society of Arts for a plaster model of the "Dying Hercules," which he had used in painting a large picture exhibited the same year at the Royal Academy. Returning to New York in 1815, he became in 1826 the first president of the National Academy of Design and was appointed in 1835 professor of the arts of design in the University of the City of New York. During this period he was constantly working on commissions, among his sitters being James Monroe, Chancellor Kent, Fitz-Greene Halleck, and Lafayette. He did not give his entire attention to art, but was interested in chemistry and especially in electrical and galvanic experiments; his interest doubtless being awakened in the subject of electromagnetism through conversations with Prof. J. Freeman Dana, who lectured in New York on that subject in 1826–27 and exhibited an electromagnet. Morse first conceived the idea of the telegraph while on board the packet ship *Sully* on his way from Europe to America in 1832, while discussing the then recent discovery in France of a method for obtaining the electric spark from the magnet. Before the close of that year a portion of the apparatus which he had devised had been constructed in New York, but it was not until three years later that, in a room at the University, he showed the telegraph operating with half a mile of wire. In September, 1837, he made a public exhibition of his discovery and in that year filed his caveat at Washington. No result followed his appeal to Congress for aid during that session, and Professor Morse visited Europe with the hope of enlisting the interests of foreign governments in his invention. In this attempt he was unsuccessful, and he returned to New York, where, as well as in Washington, he struggled under serious privations during the four years which elapsed before he obtained (1843) congressional aid. In that year, after he had almost yielded to despair, Congress at midnight, in the last moments of the session, appropriated $30,000 for an experimental line between Washington and Baltimore. After this aid had been granted, Morse succeeded after many difficulties in establishing a working telegraph line, and the first message, "What hath God wrought?" was sent from the rooms of the United States Supreme Court in the capitol at Washington to Baltimore on May 24, 1844. From this time the telegraph was an assured success, but Professor Morse was frequently involved in litigation to maintain his rights under his patents. He also was engaged in numerous controversies. But the number and character of the honors heaped upon Professor Morse on account of his invaluable invention have probably never been equaled in the case of any other American. See Telegraph.

Professor Morse set up the first daguerreotype apparatus and with Prof. John W. Draper was associated in taking the first daguerreotypes in America; he also laid the first submarine telegraph line (in New York harbor in 1842); and from him, in a letter to the Secretary of the Treasury of the United States in 1843, seems to have come the first suggestion of an Atlantic telegraph. His last public act was the unveiling of a statue of Benjamin Franklin in Printing House Square, New York. He died in New York, April 2, 1872. Consult Prime, *Life of S. F. B. Morse* (New York, 1875), and E. L. Morse (ed.), his son, *Samuel Finley Breese Morse, his Letters and Journals* (2 vols., Boston, 1914).

MORSE, Sidney Edwards (1794–1871). An American journalist, geographer, and inventor, a brother of Samuel F. B. Morse. He was born in Charlestown, Mass., graduated at Yale in 1811, studied theology at Andover and law at Litchfield, Conn., and in 1815 established the Boston *Recorder*, a weekly religious newspaper, which he edited for more than a year. In 1820 he published a small geography and in 1823 a larger one called *A New System of Modern Geography*, of which more than 500,000 copies were ultimately sold. The success of the book was partly due to the later use in it of superior map prints in color produced by a new process called cerography, which he, with the assistance of Henry A. Munson, developed in 1839. In 1823, with his brother Richard, he established the New York *Observer*, another religious weekly, and he continued to be its chief editor and proprietor until 1858. He afterward invented an instrument called a bathyometer, for ascertaining sea depths, exhibited at the Paris Exposition of 1869 and in New York City in 1870. Besides his works on geography he published *Premium Questions on Slavery* (1860).

MORSELLI, môr-sĕl'lē, Enrico Agostino (1852–). An Italian alienist and neurologist, born at Modena. He graduated at the university of that city in 1874, studied psychiatry at Reggio under Livi and anthropology at Florence under Mantegazza, and subsequently became professor of psychiatry in the Turin medical school and physician in charge of the insane asylum in the same city. In 1889 he

was called to Genoa to fill the chair of mental and nervous diseases; in 1910 he became also professor of experimental psychology. Among his many works are: *Il trasfusione de sangue* (1876; 2d ed., 1886); *Il suicidio* (1879; Eng. trans., *Suicide*, 1882); *Critica e riforma del metodo in antropologia* (1880); *Il magnetismo animale* (1886); *Antropologia generale* (1887–1911); *Carlo Darwin e il darwinismo, etc.* (1892); *Manuele di semeiotica delle malatie mentali* (1898); *Linda e Tullio Murri* (1905); *Psicologia e spiritismo* (1908). Morselli became coeditor of the *Rivista sperimentale di Freniatria e di Medicina Legale* in 1875 and of the *Archivo di Psichiatrica* in 1885.

MORSHANSK, môr-shänsk'. An important commercial town in the Government of Tambov, Russia, situated near the river Tsna, about 60 miles north-northeast of the city of Tambov (Map: Russia, F 4). It produces tallow, soap, and spirits on a large scale and is the seat of an extensive trade in agricultural products and live stock. Pop., 1897, 27,756; 1911, 31,802.

MORTAL'ITY, STATISTICS OF. See LIFE INSURANCE; VITAL STATISTICS.

MORTAL SIN. In Roman Catholic theology, the name given to the graver class of sins, in distinction from venial sins (q.v.). For a sin to be mortal it must be a conscious violation of a known divine law, decided upon deliberately by a free will, a deliberate choice of an end of action apart from God, and it must usually be in a matter of importance, because trivial matters do not usually determine supreme choices. Mortal sin, as its name implies, is believed to destroy absolutely the divine life of grace in the soul and render it deserving of eternal punishment, unless remitted by perfect contrition or by attrition in conjunction with the sacrament of penance (q.v.).

MORTAR (OF., Fr. *mortier*, from Lat. *mortarium*, mortar; connected with *marcus*, hammer, Skt. *mar*, to crush). A mixture or paste of cement or lime and sand. Mortars may be classified, according to the nature of the cementing substance used, into common lime mortar and cement mortar.

Lime Mortar. Mortar made of common lime is extensively used because of its intrinsic cheapness and the ease with which it can be prepared. It sets or becomes hard only in air, however, and should consequently not be used under water, in wet places, or in freezing weather. Its small strength compared with cement mortar, however, limits its use to structures in which great strength is not required. In making lime mortar the proportions of the mixture are usually about one volume of lime to from two and one-half to three volumes of sand, with four parts of sand as a maximum, the rule being to add sand until the mortar works well with a trowel. The lime is placed in a layer in a shallow box or in a depression scooped out of the sand and then sprinkled with a quantity of water from two and one-half to three times the volume of the lime. This being done, the lime should be left to slack undisturbed. It is generally held by engineers that the lime should be slacked at least 24 hours before it is mixed with the sand. This is frequently not done, through haste or carelessness, in common building operations. It is also important that all the water required for slacking should be added to the lime at one time, since the addition of water after slacking has begun retards that process and results in the production of a lumpy mortar. After the lime has been slacked the sand is spread in a layer over its top and the two materials are mixed and remixed by means of a hoe or shovel until a uniform paste is secured. The mortar is then ready for use. Formerly all brick was laid in lime mortar, but now, except for small buildings, it has been largely supplanted either by a cement mortar or a cement mortar with lime paste.

Cement Mortar. The most valuable of all mortars are those made with natural or Portland cements, the latter being preferable (see CEMENT), as a binding material. The proportions of the ingredients that are most commonly used are one part cement and two or three parts sand. To make the mixture, about half the sand is spread in a layer over the bottom of the mixing box; the cement is then spread in a layer over this sand bed and is in turn covered with the remainder of the sand. The mass of cement and sand is then turned and re-turned with a shovel until the two ingredients are thoroughly intermingled. Water is then added to the mixture, which is again turned by the shovel. To cause the mortar to be handled on a trowel more easily and to make it more plastic and smooth lime paste may be added to cement mortar in moderate proportions. Where cement mortar is used for bricklaying with all the voids filled, there results a monolithic mass which will break through the bricks themselves as readily as through the joints. To make colored cement mortars various substances are added, but the effect is to make the mortar weaker, and often the color is not permanent.

Pointing Mortar. A special mortar for protecting the joints in masonry, either a rich mixture of Portland cement and sand or neat cement.

Grout. A thin or liquid mixture of lime or cement is called grout. It is used to fill up small interstices by pouring it upon the masonry, into the voids of which it is expected to find its way.

Water-Tight Mortar is made of varying proportions of Portland cement, sand, and lime.

Consult: Heath, *A Manual of Lime and Cement* (New York, 1893); I. O. Baker, *A Treatise on Masonry Construction* (10th ed., ib, 1909); M. A. Howe, *Masonry* (ib., 1915). See BRICKWORK; BUILDING; CEMENT; MASONRY.

MORTAR. A cannon designed to reach its target from above by employing a very steep angle of fall of projectile. For instance, as a coast-defense weapon the mortar is used to attack the deck instead of the armored sides of a ship. In the field it may be used to attack the overhead cover of land fortifications, to search trenches, or to reach the personnel protected by very steep cover. Relatively to calibre the mortar is shorter than the howitzer or gun; uses angles of elevation as great as 70 degrees; secures change in range by varying both the projectile charge of powder and the angle of elevation. In the United States service, mortars are used only in the coast-defense service; calibre 12-inch, range about 12,000 yards, weight of projectile 1000 pounds. In Europe mortars of various calibres, from 3-inch up to 16.5-inch, were used in the field during the European War of 1914. The ordnance surprise of this war was the great German 42-centimeter (16.5-inch) mortar used in the reduction of the Liége forts.

The length of this powerful weapon was about 24 feet, diameter of bore 16½ inches, weight of shell 1760 pounds, bursting charge 400 pounds high explosive, ranges used from 8300 to 15,000 meters. The gun and carriage were drawn by large tractors. At Namur the great Austrian 12-inch Skoda mortars were used, also German 8.3-inch and smaller. See HOWITZER; COAST ARTILLERY; HEAVY FIELD ARTILLERY; ORDNANCE; ARTILLERY.

MORTARA, môr-tä'rä. A town in the Province of Pavia, Italy, situated on the Arbogna, 25 miles southwest of Milan (Map: Italy, B 2). Its Gothic church of San Lorenzo contains paintings by Lanini and Ferrari. There is a technical school and a theatre. Manufactures of machines and hats are carried on. Cheese is produced. At the battle of Mortara, March 21, 1849, the Austrians defeated the Sardinians. Pop. (commune), 1901, 8631; 1911, 10,468.

MORTARA, EDGAR. A Jewish boy whose alleged abduction excited much interest in Europe in 1858 and following years. He was the son of Momolo Mortara, a resident of Bologna, and was forcibly taken from his father's house on June 23, 1858, by the authorities on the ground that he had been baptized into Christianity by a Roman Catholic maidservant. The efforts of the parents to recover the boy aroused much sympathy, even from some Catholic rulers in Europe, but were unsuccessful. Apparently of his own choice he remained with the church authorities, was educated for the priesthood, became an Augustinian monk, and has preached as a missionary in the German cities and in New York. A drama by Moos, *Mortara, or the Pope and his Inquisitors* (Cincinnati, 1860), was founded on the case. Consult *The True Story of the Jewish Boy Edgar Mortara* (London, 1860).

MORTAR VESSEL. A vessel fitted for carrying and operating a mortar. Such a vessel requires good beam and a strong deck to resist the recoil of the mortar. During the Civil War schooners were used as mortar vessels. In Europe ketch-built vessels were largely used for this purpose, the so-called bomb ketch being a frequent adjunct to a fleet in conducting operations against land defenses. Mortars are no longer used, high-angle fire being obtained from longer guns, so that mortar vessels are obsolete.

MORTE D'ARTHUR, môrt där'tur' (OF., the death of Arthur). The name applied, in slightly varying forms, to several versions of the Arthurian legend and cognate stories. (See ARTHUR.) There are two English metrical romances of the name, each existing in a single manuscript and probably based on French originals. But in more than one way the most important work bearing this name is the celebrated redaction or blending by Sir Thomas Malory of French and English romances. It was completed in 1469 and first printed, by Caxton, in 1485. Of this edition but two copies exist, the only perfect one in New York; a scholarly reprint of it, with valuable editorial matter, was made by Sommer (London, 1889). The book probably did more than any other influence to nationalize the Arthurian legend, and the poets, from Spenser to Tennyson (in the *Idylls of the King*), have drawn abundantly on its treasures. The best modern editions, besides that mentioned above, are by Israel Gollancz, "Temple Classics" (4 vols., New York, 1900); Edward Strachey (ib., 1907); the Everyman edition (2 vols., ib., 1908); Ernest Rhys (ib., 1909). Consult: J. L. Weston, *Survey of Arthurian Romance* (1905); G. H. Maynadier, *Arthur of the English Poets* (Boston, 1907); H. O. Sommer (ed.), *Vulgate Version Arthurian Romances*, published by the Carnegie Institution (Washington, 1909–12).

MORTEMART, môrt'mär', FRANÇOIS ATHÉNAÏS DE ROCHECHOUART DE. See MONTESPAN, MARQUISE DE.

MORTGAGE, môr'gâj (OF. *mortgaige, morgage*, Fr. *mortgage*, from *mort*, from Lat. *mortuus*, dead, from *mori*, Skt. *mar*, to die + *gage*, ML. *vadium, wadium*, from Goth. *wadi*, OHG. *wetti*, Ger. *Wette*, AS. *wedd*, archaic Eng. *wed*, Lat. *vas*, pledge, Lith. *vaduti*, to redeem a pledge). In English and American law, the conveyance or transfer of property, either real or personal, as security for the payment of a debt or the performance of a legal obligation.

The debtor or obligor may, and usually does, retain possession of the property mortgaged—the validity of the security not depending upon possession as in the case of pledge (q.v.) and common-law lien (q.v.). This method of securing performance of an obligation was known to the ancient law; and under the civil law the distinction was well settled between *hypotheca*, in which the property given as security remained in the possession of the debtor, and *pignus*, in which the property given as security was surrendered to the creditor.

The giving of security by mortgage first became of importance at common law after the passage of the Statute *Quia Emptores* (18 Edw. I), by which the restraints on alienation of lands held in fee were removed. Mortgages were then in form conditional grants, a form of gift or limitation peculiarly adapted to the giving of security without necessarily changing the possession of the security. At common law the owner of real estate might grant to another any estate in fee with the right on the part of the grantor or his heirs to reënter upon the property and revest the title in the grantor or his heirs upon the happening of a specified condition.

By making the condition of reëntry the payment of money or the performance of an obligation due from the grantor to the grantee, all the essentials of a common-law mortgage were created. Upon payment of the sum due when due, the condition of the grant or conveyance was satisfied, and title was thereby revested in the grantor or mortgagor. But if the mortgagor failed to pay the mortgage debt when due, performance of the condition thereafter became impossible, and the mortgagor thereby lost all claim upon the mortgaged property.

Equity early exercised its jurisdiction to mitigate the harsh operation of this common-law rule by allowing the mortgagor who had failed to perform his obligation upon the due date (or the law day, as it was called) to redeem the mortgaged property upon payment of the sum due with interest. This right of the mortgagor was known as his equity of redemption and was unlimited in point of time. But as this unlimited right of redemption of the mortgage rendered it impossible for the mortgagee to realize on his security, equity also gave to the mortgagee the right to cut off the right of redemption by foreclosure, which was an equitable suit asking a judicial declaration that the right to redeem had been forfeited.

The modern law of mortgages, then, combines both legal and equitable doctrines; and many of its peculiarities, both of form and substance, will be explained by reference to the historical development of the law. While the mortgage in modern practice may, for most purposes, be regarded only as a lien created in favor of the mortgagee, it is still in form a conveyance vesting the title of the property in the mortgagee, and, in the absence of statute, it is generally the rule that no mortgage valid at law can be created without a conveyance.

It is usual to incorporate in the mortgage a clause providing for the defeasance of the title upon payment of the mortgage indebtedness, but, as will appear, even that is not essential. In some States statutes have been passed authorizing a mortgage which is not a conveyance in form, but which for all practical purposes has the same effect as the common-law mortgage as modified by equity. One important consequence arising from the fact that at common law the mortgagee acquired a title was that his mortgage was valid against an innocent purchaser of the property for value without notice of the mortgage, which could not have been the result had the mortgage been a mere lien or right in personam against the mortgagor. See EQUITY.

This rule has been modified in the United States by statutes universally adopted requiring mortgagees and purchasers of property generally to record their documents of title in order to protect them against claims of purchasers without notice.

When the intention of an agreement is to create a mortgage, although it is not in effect a conveyance and consequently not a legal mortgage, equity will enforce the agreement against the mortgagor or third parties having notice of the agreement as though it were a valid mortgage.

Thus, where the owner of real estate deposited his title deeds of the property with another for the purpose of securing a debt or obligation, the English courts of equity have recognized in the transaction a valid mortgage. This doctrine of creating a mortgage by pledge of title deeds has not been recognized in the United States, except, perhaps, in the State of New York. When a conveyance is absolute on its face, equity will inquire into all the circumstances of the transfer of title and, if it appear that the transfer was made only for the purpose of giving security, will treat the transaction as a mortgage and allow the grantor to redeem the property upon payment of the mortgage indebtedness. All mortgages, however, whether express or implied from the circumstances, are to be distinguished from conditional sales, which are agreements to sell and transfer title to the property upon the happening of a certain event. It will be observed that the position of a mortgagor is closely analogous to that of a conditional vendor who has agreed to sell property upon payment of a certain sum. There is, however, one important distinction between the two relations. In the case of conditional sales there is no existing indebtedness. The vendee is under no obligation to pay money to the vendor before electing to purchase, while the mortgagor is so bound. In determining in any given case whether the transaction is a conditional sale or a mortgage, courts will scrutinize the evidence with great care and in case of doubt will hold the transaction to be a mortgage. From the nature of the mortgage it seems probable that a legal liability independent of the mortgage itself is not essential to its validity, but in general all mortgages are accompanied by some form of legal obligation for the performance of which the mortgage is given as security. This is usually a promissory note or bond payable to the mortgagee, and, where the purpose is to issue numerous bonds secured by one mortgage, the practice is to make the mortgage or conveyance to a trustee, who holds the property as security for all the bondholders. Railroad mortgages are usually of this kind. If the note or bond is illegal or if there is any illegality in the mortgage transaction, the mortgage is invalid.

Mortgages are sometimes given to secure future advances to be made by the mortgagee. Such mortgages are everywhere valid and enforceable as between the mortgagor and mortgagee, but in some States they are held not to be valid against third parties, except as to advances actually made, of which the third party has actual or constructive notice at the time of acquiring an interest in the property. In a number of States, statutes provide that mortgages for future advances shall have no validity against third persons.

Any legal property, either real or personal, may be mortgaged, even including future or inchoate property, as crops planted but not yet grown, which the common law regards as being capable of present ownership. But a mortgage of property not yet acquired by the mortgagor could have no validity at common law on the principle that "a man cannot grant that which he hath not." Mortgages of this character as well as mortgages of equitable interests are, however, recognized and enforced by the courts of equity when the rights of innocent third parties are not involved. Such mortgages are now generally regarded as valid between mortgagor and mortgagee, but there is a variety of views held in the several States as to their validity against third parties—some courts, as those of Massachusetts, holding that they can have no validity even against creditors of the mortgagor unless the mortgaged property is delivered to the mortgagee, and some, as those of New Jersey, holding that they are valid against all parties having notice of the mortgage.

The mortgage, besides a description of the mortgaged property and the mortgage indebtedness, may, and usually does, contain clauses providing that the whole debt shall become due and payable upon failure to pay interest or taxes and assessments upon the mortgaged property. The mortgage may also include a power of sale enabling the mortgagee to sell the mortgaged property without foreclosure upon the mortgagor's failure to pay the debt. In some States such a provision is made inoperative by statutes which require foreclosure of the mortgage exclusively by judicial proceedings, and in others the power of sale is regulated by requiring due notice by public advertisement or by requiring that the sale itself shall be public. A stipulation that the mortgagor shall have no right to redeem will be disregarded by the courts upon the same principle that courts of equity disregard the condition of forfeiture of the common-law mortgage, viz., that equity will relieve a mortgagor from an oppressive condition or stipulation.

The estate of the mortgagor in possession has been likened to a tenancy at will or by suffer-

ance, and as between himself and the mortgagee, the analogy is very close. At common law the mortgagee having the title could take possession at will, the sole right of the mortgagor, if the mortgagee exercised this right, being to redeem by payment of the mortgage indebtedness on the due date. But as to all others, the mortgagee in possession is clothed with substantial ownership. He is entitled to the rents, issues, and profits of the mortgaged property; he may sell or encumber it subject to the mortgage, and upon his death the property goes to his heirs at law.

In many States the mortgagee's common-law right to take possession of the mortgaged property by ejectment or other appropriate action has been cut off by statute, and he can only secure possession of the mortgaged property after default and through foreclosure.

Although the mortgagee holds the title to the mortgaged property, the law recognizes that he holds it as an incident to his claim against the debtor, which is personal property. The mortgagee's estate, therefore, in both real and personal property, is regarded as personal property only and passes, upon his death, to his personal representative and not to his heirs.

In general, the mortgagee out of possession is in the position of one having a mere lien or personal claim against the mortgagor. But the mortgagee in possession of the mortgaged property, who was at common law substantially in the position of owner of the property, is compelled by equity to account for the rents, issues, and profits and to apply them upon the mortgage indebtedness.

Both the mortgagor and the mortgagee may freely assign their interests. It is not unusual for the assignee of the mortgagor to assume the mortgage indebtedness by the instrument of assignment, and it is the general rule that the mortgagee may enforce this undertaking either upon the theory of subrogation or that the mortgagee may sue upon a contract made for his benefit.

When several mortgages are given upon the same property they have priority in the order of their creation unless otherwise provided. This rule may be varied by the operation of recording acts, which usually give priority to mortgages in the order in which they were recorded.

A mortgage is extinguished by payment of the mortgage indebtedness or by a legal tender of the amount due on the day when due. Tender after that time has no effect at common law, and in equity the only effect is to prevent interest accruing. A mortgage may also be terminated by a release thereof by the mortgagor or by a merger resulting from the union of the mortgage estate and the equity of redemption in the same person. If the merger is accomplished by a conveyance of the mortgaged property by the mortgagor to the mortgagee, the courts will scrutinize the transaction with the greatest care and, if there appear to have been any oppression or undue influence on the part of the mortgagee, will allow the mortgagor to redeem. See MERGER.

A mortgage is extinguished by the final judgment or decree in an action to foreclose the mortgaged property or in an action to redeem it from the mortgagee. See FORECLOSURE; EQUITY OF REDEMPTION.

Courts have always favored the mortgagor's right to redeem, and at any time before the extinction of the mortgage will allow him to compel a cancellation and surrender of the mortgage upon payment of the mortgage indebtedness with interest and, as an incident to the redemption, will compel the mortgagee to account for rents or profits which he has received. Consult: D. H. Pingrey, *Treatise on the Law of Chattel Mortgages* (Newark, N. J., 1891); id., *On the Law of Mortgages of Real Property* (2 vols., Philadelphia, 1893); Coote, *Treatise on the Law of Mortgages* (7th ed., London, 1904); L. A. Jones, *Treatise on the Law of Mortgages of Real Property* (6th ed., Indianapolis, 1904); id., *Personal Property* (5th ed., ib., 1908); and the authorities referred to under REAL PROPERTY. See also CHATTEL MORTGAGE.

MORTGAGE BANKS. Institutions designed to furnish long-term credit on real security. In 1686 a plan for a bank to issue bills on real-estate security was approved by the Governor and Council of Massachusetts Bay. The plan fell through, but a number of similar schemes were launched in Colonial America, such as the Public Loan Office of Pennsylvania (1722), the New London Society of Connecticut (1732), the Land Bank scheme of Massachusetts Bay Province (1740). These and similar schemes all failed, on account of improper financial methods. The first really successful enterprise of the kind was the Silesian Landschaft, created by Frederick the Great in 1769. The plan of operation involved the organization of all the noble landholders of the province into essentially a mutual-credit association. All lands were appraised by the association, and the amount that each landowner might borrow was fixed. Upon application any member might obtain debentures, secured by the collective property of the association, through the sale of which he might obtain the funds required. The King granted to the association a subsidy of $216,000, later increased to $432,000. This association is still in existence and in 1912 had loans outstanding to an aggregate of $97,919,605. Similar associations were founded in a number of the Prussian provinces during the eighteenth century: Kür and Neumark, 1774; Pomerania, 1781; West Prussia, 1787; East Prussia, 1788; Lüneburg, 1790. The general principles of mutual credit, the issue of debentures based on the collective property of the association, etc., were the same. The effect of the plan was to mobilize real credits. The debentures, unlike mortgages on specific tracts of land, enjoy a national market. This feature was further emphasized by the creation in 1873 of the Central Landschaft of Prussia, which correlates the activities of seven Landschafts and one communal credit association. Besides the Landschafts there are found in Germany a large number of other land-credit banks.

In France the most important mortgage-credit institution is the Crédit Foncier, founded in 1852, with a capital now amounting to $45,000,000. The Crédit Foncier lends on mortgages, either repayable at long term by annuities or at short term with or without amortization. Loanable funds it raises through the sale of debentures secured by its collective assets.

Mortgage banks of a character similar to the German and French banks have been established in most European and several non-European countries. They enable the borrower on real

security to secure loans at low interest, repayable usually at his option, and with maximum term of 30 years in Finland, 33 in Chile, 36½ in New Zealand, 42 in Australia, 50 in Italy and Japan, 54½ in Austria, 55½ in Russia, 56½ in Germany and Sweden, 57 in Switzerland, 60 in Denmark, 63 in Hungary, and 75 in France. For the most part such institutions are primarily designed for the aid of agriculture, but they are extensively employed for financing the purchase and improvement of urban property as well. See RURAL CREDIT.

MORTGAGES, TACKING OF. See TACKING OF MORTGAGES.

MORTIER, môr'tyâ', EDOUARD ADOLPHE CASIMIR JOSEPH, Duke of Treviso (1768–1835). A French marshal. He was born at Cateau-Cambrésis, Feb. 13, 1768. His father was a deputy to the States-General in 1789, and though Mortier was educated for a business career, he entered the service of the Republic as a sublieutenant of carbineers in 1791. He rose rapidly and in 1793 became adjutant general. After greatly distinguishing himself under Moreau and Kléber, he was made a general of division in 1799. In 1803 he was in command in Hanover and in the administration of that country showed the utmost probity and sagacity. Created a marshal of the Empire in 1804 and placed in charge of an army corps in 1805, Mortier showed his military genius by holding in check a superior force of Russians at Leoben. In 1806 he occupied Hanover, Hesse-Cassel, and Hamburg and defeated the Swedes in several encounters. He commanded the left wing of the French army at Friedland and after the Peace of Tilsit was intrusted with the government of Silesia and created Duke of Treviso. Sent to Spain in 1808, he took part in the siege of Saragossa and defeated the Spaniards at Ocaña (Nov. 19, 1809). After sharing in the Russian campaign of 1812 Mortier took a decisive part in the battle of Lützen (May 2, 1813) and in all the subsequent military events of 1813–14. When Napoleon's cause was lost, Mortier at last gave in his adhesion to the government of Louis XVIII. During the period of the Hundred Days, Mortier first saw the King safely out of France and then joined his old leader. After the Second Bourbon Restoration he was crossed off the list of peers for refusing to sit on the court-martial of Ney. He became a member of the Chamber of Deputies in 1816 and was restored to the Chamber of Peers in 1819. After the revolution of 1830 he was made Ambassador at St. Petersburg, became Grand Chancellor of the Legion of Honor in 1833 and Minister of War and President of the Council in 1834–35. He was killed on the Boulevard du Temple, July 28, 1835, by a missile from the infernal machine of Fieschi (q.v.).

MORTILLET, môr'tē'yâ', LOUIS LAURENT GABRIEL DE (1821–98). A French anthropologist, born at Meylau, Isère. His interest in prehistoric archæology dates from a trip to Italy in 1858, and he began to study the Swiss lake dwellings. In 1864, after his return to France, he founded a review, *Matériaux pour l'Histoire Positive et Philosophique de l'Homme,* and in 1868 became an assistant, and later conservator, at the Museum of Saint-Germain. In 1876, with Broca, he planned the Ecole d'Anthropologie. He also was active in politics, mayor of Saint-Germain-en-Laye, and in 1885 deputy from Seine-et-Oise, as a strong anti-clerical. His published works include: *Le signe de la croix avant le christianisme* (1866); *Les habitations lacustres du lac du Bourget* (1867); *Origine du bronze* (1876); *Le préhistorique* (1882); *Origines de la chasse, de la pêche et de l'agriculture* (1890); *Formation de la nation française* (1897).

MOR'TIMER, EARL OF OXFORD AND. See HARLEY, ROBERT.

MORTIMER, JAMES (1832–1911). An American diplomat and playwright. After leaving Annapolis he served in the navy for a time and then entered journalism at Philadelphia. In 1850 he started the Frankford *Journal,* but shortly afterward became an attaché of the American Legation at Paris. He spent some years as secretary to the United States Minister at St. Petersburg and finally became Paris correspondent of American newspapers. Mortimer contributed also to the Paris press, and some of his articles brought him to the favorable notice of Napoleon III. He served as a messenger between the Emperor and the Empress Eugénie, and the Emperor provided the funds with which he started the London *Figaro* in 1870. He produced about 35 plays in London, including *Joy is Dangerous;* an adaptation, *Heartsease,* in which Madame Modjeska made her first London appearance in 1880; his best-known comedy, *Gloriana,* first played in 1891 and revived under the title *The Artful Valet;* and *My Bachelor Past.*

MORTIMER, ROGER DE (?1287–1330). First Earl of March and eighth Baron of Wigmore. For some years he was a faithful adherent of Edward II of England and from 1316 to 1321 his representative in Ireland to oppose Edward Bruce; but soon after he was recalled in 1321 Mortimer joined the insurgent barons who were hostile to the Despensers. In 1322 Mortimer submitted to Edward and was imprisoned in the Tower of London, but escaped to France two years later. There he met and fascinated Queen Isabella, wife of Edward, became her paramour, and determined upon the overthrow of the King. With a small force the two landed on the English coast in 1326 and were soon joined by large numbers of the discontented nobles and common people. The King was defeated, taken prisoner, and probably murdered in his prison in 1327. Mortimer took the title of Earl of March in 1328 and received confiscated estates and offices of immense value, while his creatures controlled the administration. Edward III was a minor, and, though a council held the regency, Mortimer's influence was supreme. Mortimer became very unpopular when he made the Shameful Peace with the Scots in 1328. Finally Edward III resolved to be King in fact as well as in name, had the Earl of March seized at Nottingham Castle, and summoned a new Parliament. Mortimer was tried on charges of treason, condemned, and in 1330 hanged, drawn, and quartered. (See Edward III.) Consult William Longman, *Edward III,* vol. i (London, 1869), and William Stubbs, *Constitutional History,* vol. ii (6th ed., Oxford, 1897).

MORTIMER'S CROSS, BATTLE OF. See EDWARD IV; ROSES, WARS OF THE.

MORT'MAIN (OF. *mortemain,* from ML. *mortua manus,* dead hand), STATUTES OF. In England, the acts of Parliament prohibiting or restricting the alienation of lands to corporations. The term "mortmain" is applied to the perpetual tenure of lands by corporations, par-

ticularly religious corporations, whose members and officers, being ecclesiastics, were by the common law deemed civilly dead, *civiliter mortuus*, and hence the derivation of the term as signifying land held by the dead hand of the Church. In later times the term has been applied to the tenure of lands by corporations generally, whether ecclesiastical or lay.

Mortmain first became a matter for the serious attention of English legislators and lawyers as early as the reign of Edward I. The policy of the various ecclesiastical corporations of acquiring large holdings of land and retaining them became a menace to the well-being of the state, partly because it afforded a ready means of accumulating wealth and power which were held in strict allegiance to the Church, whose interests were often in conflict with those of the civil authority, but primarily because the ownership of land by ecclesiastical corporations was inconsistent with feudal tenure. The feudal system presupposed the holding of land by a tenant who could render to his overlord certain fixed services, military or other, and certain dues, known as incidents, under certain circumstances. The most important of these incidents were: (a) *Aids.*—Assessments levied by the lord on his freehold tenants for knighting the lord's eldest son, marrying off his eldest daughter, and ransoming his body from captivity. (b) *Relief.*—The sum which an heir was required to pay to the lord upon coming into his ancestor's tenancy. (c) *Wardship.*—The right of the lord to become the guardian of the infant heir of his tenant and take the profits of the estate during the heir's minority. (d) *Marriage.*—The right of the lord to dispose of the tenant's daughter in marriage. (e) *Escheat.*—The right of the lord to the freehold upon the death of the tenant without heirs.

It is apparent that the acquisition of land by an ecclesiastical corporation, which could not die or contract marriage and which had none of the other attributes of a natural person, struck at the very basis of the feudal system and was regarded with jealousy by the great lords and the civil officers of the crown. The result was a series of legislative enactments, extending over a period of nearly 600 years, having for their purpose the restraint of alienation in mortmain. No sooner did the will of the state find expression in appropriate legislation for this purpose than the powerful influence of the Church was exerted to evade or nullify it by judicial interpretation or by resort to legal fictions invented by skillful lawyers and urged by them upon the courts with such success that ultimately new legislation became necessary. To this historic struggle between the Church and the landed aristocracy are attributable many of the peculiarities of the law of real property to this day.

The earliest statute relating to the subject after the fall of the Western Empire was an edict of the Emperor Frederick Barbarossa in 1158 prohibiting conveyances to Church corporations. In England there have been enacted in all 21 statutes affecting the power to alienate in mortmain. The earliest of these (a provision contained in Magna Charta, c. 43, that there should be no transfer of land to Church corporations by a tenant without the consent of his lord) seems to have fallen into disuse or to have been evaded by conveyances direct to the officers of the religious houses, who held the property "to the use," i.e., for the benefit, of such houses.

The next statute of importance, and the first to curb effectively the acquisition of land by the ecclesiastical corporations, was the Statute *De Religiosis* (7 Edw. I, St. ii, c. 13), passed in 1279.

This statute made all alienations in mortmain unlawful and made the provision effective by enacting that all such conveyances should work a forfeiture to the lord of the land attempted to be conveyed. The lawyers of the time, however, soon devised a method for evading the statute by the invention of the common recovery (q.v.), a fictitious suit brought against the would-be grantor, to which the courts gave the effect of a conveyance. This development in the common law was met by a new legislative enactment (13 Edw. I, c. 32) in 1285, which forbade alienation of lands in mortmain by common recovery and attached the same penalty to such alienation as in case of the conveyances forbidden by the Statute *De Religiosis.* The Statute *Quia Emptores* (18 Edw. I, c. 1), which removed some of the common-law restraints upon alienation, expressly excluded from its operation all alienation in mortmain.

These statutes in time were evaded by the practice of conveying lands to a layman, to be by him held for the use or benefit of an ecclesiastical corporation, which obligation came to be enforced by the Chancellor. The use was the forerunner of the modern trust and the basis of equity jurisdiction over trusts. In 1391 this practice was forbidden on pain of forfeiture, unless such conveyance to uses was licensed by the King (15 Rich. II, c. 5).

The Statute of Wills, allowing testators to dispose of their property by will, did not in terms permit the testator to devise real estate to a corporation. By judicial interpretation, however, the power was established to devise lands to corporations for charitable purposes.

From this period down almost to the present time statutes have been enacted modifying or further restraining the power of alienation to corporations, whenever judicial interpretation or the ingenious devices of lawyers made such enactments necessary.

The Statute of 9 Geo. II, c. 36 (1736), is noteworthy in that it shows that the policy on which the Statute of Mortmain had hitherto been based had then changed somewhat. This statute, reciting that "public mischief had greatly increased by many large and improvident dispositions made by languishing and dying persons to charitable uses, to take place after their deaths, to the disinherison of their lawful heirs," enacted that in future no lands or sums of money to be laid out in land should be given to any person or body unless such gift or conveyance should be made or executed in presence of two witnesses 12 months before the death of the donor or grantor and be enrolled in the Court of Chancery within six months after the execution. Under this act, therefore, a person on his deathbed cannot in England give land, or money to buy land, for a charitable purpose. It can only be done in the life of the donor at least 12 months before his death, and the property must be completely alienated so that he has no further control over it.

All the English statutes of mortmain were revised and consolidated by the Statute of 51 and 52 Vict., c. 42. In general this statute still restricts alienation to corporations, but it

makes numerous exceptions in favor of gifts to churches, public parks, museums, and for educational, literary, and scientific purposes. Gifts to charity by will are regulated by the Statute of 54 and 55 Vict., c. 73, which in general permits such gifts of land to charities if the land be sold within one year from the testator's death. Throughout the period of mortmain legislation it was possible for the crown to grant a mortmain license enabling a corporation to purchase and hold lands, a prerogative which at times was freely exercised and sometimes grossly abused.

Owing generally to the absence of great religious corporations in the United States and to the fact that the feudal system never obtained a foothold there, the mortmain acts were not reënacted, with possibly one or two exceptions. Pennsylvania has a mortmain act, and New York has a statute which, like the Statute of 9 Geo. II, seems calculated rather to restrain a testator from making unwise and improvident gifts to charity than to prevent landholding by corporations. The statute provides that a testator who leaves surviving him a wife, child, or parent shall not devise or bequeath more than one-half of his estate to a charitable corporation, and no such devise or bequest shall be valid unless made more than two months before the death of the testator.

In many States business corporations may not receive real estate by devise, but generally charitable corporations may do so; and in most States there is no restraint upon conveyance of lands inter vivos to corporations, unless the charter of the corporation or the general law under which it is created limits the total amount of land which the corporation may hold. Consult Antony Highmore, *View of the History of Mortmain* (London, 1809), and J. Rawlinson, *Notes on the Mortmain Acts* (ib., 1877). See Charitable Trusts; Trust; Uses; and consult the authorities there referred to, and also under Real Estate.

MORTO DA FELTRE, môr'tô dȧ fĕl'trȧ (c.1474–c.1519). An Italian painter, born at Feltre. His fame rests upon Vasari's statement that he was the first to use classic arabesques in ornamentation. Of his life nothing certain is known, nor do any authenticated works by him survive. Cambruzzo, a seventeenth-century historian of Feltre, identified him with Pietro Luzzi (also called Zarato) of that town, who was an assistant of Giorgione at Venice. Luzzi is recorded as having been at Rome in 1495, at Florence in 1506, and at Venice in 1508. He is known to have decorated with frescoes the town hall, the church of San Stefano, and two houses in his native town. According to the usual account, Morto was killed fighting in the Venetian army at the battle of Zara; but if he be identical with Luzzi, he cannot have died till after 1519, in which year the latter was active in his native town.

MORTON, môr'ton, Charles (1627–98). An English clergyman and educator, born at Pendavy, Cornwall, and educated at Wadham College, Oxford. He renounced the Royalist traditions of his family and became a Puritan, though he did not leave the Anglican communion until 1662. He opened what proved to be the leading school for English Dissenters at Stoke Newington, near London, which he maintained until 1685, having Daniel Defoe among his pupils, besides several others who became prominent as dissenting ministers. Contrary to the custom of the universities, he made his pupils write their dissertations and hold their disputations in English—a practice which, Defoe affirms, made his pupils excel in English those of any other school. Tormented by proceedings against him in the ecclesiastical courts, Morton emigrated to New England in 1686. He settled first at Charlestown, Mass., and became the pastor of a church there. He became connected with Harvard College, and two of his manuscript works—*A System of Logic* and *Compendium Physicæ*—were used as textbooks. He was made the first vice president of the college and hoped to succeed Increase Mather as president. His death prevented the fulfillment of this ambition. Though a man of great ability, both in theology and mathematics, he shared in the prevalent superstition against witchcraft and encouraged those who brought about the prosecutions at Salem. Consult Josiah Quincy, *History of Harvard University* (Cambridge, Mass., 1840), and I. Parker, *Dissenting Academies in England* (Cambridge, 1914).

MORTON, George (c.1585–c.1628). An English colonist in America. He was born in England, joined the Puritans at an early age, and removed to Holland with his brother, Thomas Morton, settling at Leyden, where for some years prior to 1620 he was an agent of the London Puritans. In the latter year he sailed for New England in the ship *Ann*, in charge of a party of new Puritan settlers for the Plymouth Colony. He remained at Plymouth several years and then returned to England. The book known as *Mourt's Relation* (1622), which was the first published account of the New England settlement, comprising a journal of the first 12 months of the Plymouth Colony, has the name G. Mourt subscribed to the preface, and for that reason has been ascribed to Morton. Careful investigators, however, among them Dr. H. M. Dexter, who reprinted the work with critical and historical notes in 1864, while agreeing that the name G. Mourt evidently referred to George Morton, are inclined to think that the account itself was the work of Bradford and Winslow.

MORTON, Henry (1836–1902). An American scientist and educator. He was born in New York and was educated at the University of Pennsylvania. He first studied law, but afterward took up chemistry, and in 1863 became professor of chemistry in the Philadelphia Dental College. In 1869 he took the chair of chemistry in the University of Pennsylvania. In 1870 he became president of Stevens Institute of Technology, at Hoboken, N. J., towards the endowment of which he contributed over $60,000. Morton took part in two eclipse expeditions, conducted important investigations in spectroscopy, and while a member of the Lighthouse Board (1878–85) carried out valuable experiments on electric lighting, fog signals, illuminating buoys, etc. His publications include numerous papers in scientific periodicals and the *Student's Practical Chemistry* (written jointly with Leeds and published in 1868).

MORTON, James Douglas, fourth Earl of (?1530–81). Regent of Scotland. The second son of Sir George Douglas of Pittendriech, in 1553 he succeeded in right of his wife, Elizabeth, daughter of the third Earl of Douglas, to the title and estates of the earldom. He early favored the cause of the Reformation, and in 1557 was one of the original Lords of the Con-

gregation. Sworn a Privy Councilor in 1561, he was appointed Lord High Chancellor of Scotland, Jan. 7, 1563. As one of the chief conspirators against Rizzio (q.v.), he fled with his associates to England, but obtained his pardon from the Queen. Though privy to the design for the murder of Darnley, on the marriage of the Queen to Bothwell he joined the confederacy of the nobles against her. After Mary's imprisonment in the castle of Lochleven he was restored to the office of High Chancellor, of which he had been deprived, and constituted Lord High Admiral of Scotland. On the death of the Earl of Mar, in October, 1572, he was elected Regent of the Kingdom. His rule, chiefly directed towards the benefit of the masses and towards the formation of a Protestant league with England, in anticipation of the union of the two kingdoms, made him obnoxious to many of the nobles, and as the young King, James VI, desired to assume the reins of government, Morton resigned the regency in March, 1578. Two months later, however, he obtained possession of the castle of Stirling, with the person of the King, and for a time recovered his authority. Intrigue, however, was active against him; he was accused of having participated in the murder of Darnley, and was beheaded at Edinburgh, June 2, 1581, bearing himself with dignity and composure and maintaining his innocence of "art and part" in the murder of the King's father. Consult Crawford, *Crown and State Officers of Scotland* (Edinburgh, 1726), and Andrew Lang, *History of Scotland* (ib., 1900–07).

MORTON, James Saint Clair (1829–64). An American soldier, a son of Samuel George Morton (q.v.). He was born in Philadelphia, graduated at West Point in 1851, and from 1855 to 1857 was assistant professor of engineering in that institution. In 1860 he conducted an exploration for a railway route across Central America for the government; in 1861 he joined the United States volunteers, was put in charge of the construction of the fortifications of Tortugas, and was promoted captain; in 1862 he became chief engineer of the Army of the Ohio, and later in the year was transferred to a like position in the Army of the Cumberland. In the same year he was promoted brigadier general of volunteers. He commanded a brigade at Stone River, was wounded at Chickamauga, and was made major of engineers in July, 1863. As chief engineer of the Ninth Army Corps he participated in Grant's Virginia campaign, and was killed while leading the assault on Petersburg. In recognition of his gallantry in this engagement Congress voted, after his death, that he be ranked as a brigadier general in the regular army. Previous to the war he published a number of works on fortification and engineering.

MORTON, John (?1420–1500). Archbishop of Canterbury and Cardinal. He was born in Dorset and educated at Cerne Abbey, a Benedictine foundation, and at Balliol College, Oxford. Having studied law, he took orders and began to practice in the Court of Arches, the ecclesiastical tribunal of the Archbishop of Canterbury. Here he attracted the attention of Archbishop Bourchier, who presented him to Henry VI, and the latter gave him valuable ecclesiastical benefices. Though he had followed for a time the fortunes of the Lancastrians, Edward IV took him into favor, made him Master of the Rolls in 1473, and in 1479 Bishop of Ely. He was not in favor with Richard III, who arrested him and committed him to the custody of the Duke of Buckingham, from whom he escaped and fled to the Earl of Richmond on the Continent. He is said to have suggested the union of the houses of York and Lancaster by the marriage of Richmond with the daughter of Edward IV. Henry VII on his accession made Morton a member of the Privy Council, and on the death of Cardinal Bourchier, in 1486, he was promoted to the see of Canterbury. In 1487 he was appointed Lord Chancellor, and in 1493 Pope Alexander VI made him Cardinal. Morton was the chief councilor of Henry VII, and hence has been held responsible, perhaps unjustly, for Henry's avarice. (See Morton's Fork.) He died Oct. 12, 1500. The history of Richard III which bears the name of Sir Thomas More was probably written in Latin by Morton. Near Ely he drained a part of the fens by Morton's Dyke. Consult: Hook, *Lives of the Archbishops of Canterbury*, vol. v (London, 1867); James Gairdner, *Henry VII* (ib., 1889); id., *Lollardy and the Reformation in England* (2 vols., ib., 1908).

MORTON, John (1724–77). One of the signers of the Declaration of Independence, born of Swedish ancestry, in Ridley Township, Chester Co., Pa. He was a surveyor for some years, but subsequently became a lawyer. He was for several years a member of the Pennsylvania Assembly, and in 1765 was chosen a delegate to the Stamp Act Congress. From 1766 to 1770 he was high sheriff of Chester County. During all this period he continued to serve in the Pennsylvania Assembly, and from 1772 to 1775 was Speaker of that body. He was an earnest champion of the rights of the Colonies in the pre-Revolutionary controversies, and was active in furthering the cause of the Revolution after the outbreak of hostilities. In 1774 he was elected a member of the Continental Congress, and remained a member of that body until his death, taking a leading part in the debates and helping to frame the Articles of Confederation.

MORTON, John Maddison (1811–91). An English writer of farces, best known as the author of *Box and Cox* (1847), which, thanks to its ingenious and laughter-provoking incidents, made a great hit in its day. He was born in Pangbourne, the son of Thomas Morton (c.1764–1838), who was also a playwright—the author of *Columbus, or A World Discovered* (1792), *A Roland for an Oliver* (1819), etc. To pay his way through the world proved, despite his literary efforts, an insoluble problem for the younger Morton, and he died a pensioner at the Charterhouse. He was the author of plays enough to put him among the most prolific of dramatists. He had a knack for adapting French pieces, and was phenomenally fortunate in fitting the play to the player. Consult the list of plays given under "Morton" in the *Dictionary of National Biography*, vol. xxxix (London, 1894).

MORTON, Julius Sterling (1832–1902). An American journalist and politician, born at Adams, Jefferson Co., N. Y. He received his early education in the Methodist Episcopal Academy at Albion, Mich., to which State his parents had moved, and in 1850 he entered the University of Michigan. He completed his course at Union College, graduating in 1854, and in the year following settled in Nebraska, first at Bellevue and later at Nebraska City, where he founded and edited the Nebraska City *News*, the first newspaper to be established in the State. In 1856 and 1857 he was elected to the Nebraska

Territorial Legislature, and in 1858 was appointed by President Buchanan Secretary of the Territory, and upon the resignation of Gov. W. A. Richardson a few months later became acting Governor and local representative of the administration in the bitter struggle in the Territory. In 1866 he was the Democratic candidate for Governor, but was defeated. From that time until 1881, when he was again a candidate for Governor, he took no part in politics. In 1893 he entered the cabinet of President Cleveland as Secretary of Agriculture, remaining in office until 1897. Upon the advent of William Jennings Bryan into Nebraska politics he became one of his most active opponents and identified himself with the Cleveland gold wing of the Democratic party. In 1901 he was appointed by President McKinley one of the United States Commissioners for the Louisiana Purchase Exposition. He was a student of forestry, the originator of "Arbor Day," and president of numerous agricultural societies. At the time of his death he was editing a weekly paper entitled the *Conservative* in which he opposed most of the doctrines advocated in Bryan's *Commoner*. He wrote an *Illustrated History of Nebraska*, published in 1905.

MORTON, Levi Parsons (1824–1920). An American banker and political leader. He was born at Shoreham, Vt., and was educated at the academy in that town. In 1843 he established himself in a mercantile business in Hanover, N. H. In 1850 he removed to Boston, where he entered the banking business, and four years later he settled in New York City, where he was successful from the start. In 1863 he founded the banking house of Levi P. Morton & Co., later Morton, Bliss & Co., which became one of the most successful private banking firms in the country. A London branch, Morton, Rose & Co., was subsequently established. In 1878 Morton was elected to Congress as a Republican, and after being reëlected in 1880, he was from 1881 until 1885 United States Minister to France, undertaking there negotiations concerning tariff rates and recognition of American corporations. In 1888 he was the successful candidate for Vice President on the Republican ticket. In 1895–96 he was Governor of New York, being most prominently associated, as such, with the abolition of the local-trustee system of school government. After retiring from public life, he continued his banking business and became interested in insurance companies. He made New York City his residence.

MORTON, Marcus (1784–1864). An American lawyer and politician, born at Freetown, Mass. He graduated at Brown University in 1804 and at the Litchfield (Conn.) Law School, was admitted to the bar in 1807, and established himself in the practice of his profession at Taunton, Mass., where he remained for the rest of his life. From 1817 until 1821 he was a Democratic member of Congress. In 1823 he was a member of the Governor's Council, in 1824 was Lieutenant Governor, and in 1825 began a notable career as judge of the Supreme Court of Massachusetts. He remained on the bench until 1839, when he was the candidate of the Democratic party for Governor, and was elected by one vote over Edward Everett, the Whig nominee, although the Whigs carried the State electoral ticket. In 1840 he failed of reëlection, but in 1842 was again elected. From 1845 to 1848 he was collector of the port of Boston. In the same year he became a violent opponent of the Democratic policy as to slavery extension, and took a leading part in the organization of the Free Soil party, by which he was elected to the State Legislature for one term. Later he identified himself with the national Republican party and loyally supported the United States government during the Civil War.

MORTON, Nathaniel (1613–85). An American Colonial historian, born of English blood in Leyden, Holland. He came to Plymouth, Mass., in 1623 and dwelt there till his death. On the death of his father he was taken into the family of Governor Bradford, whose wife was his maternal aunt, and early helped the Governor in public business. He was secretary of the court of the Colony from 1645 till his death. In 1669, at the request of the commissioners of the New England Colonies, he compiled and published at Cambridge, Mass., his *New England's Memorial, or a Brief Relation of the Most Remarkable and Memorable Passages of the Providence of God Manifested to the Planters of New England, etc.*, a work which was reprinted in England and several times in the Colonies and was the chief authority for the events of which it treated until the discovery in 1855 of Bradford's *History of Plymouth*, on which, together with the journals of Winslow, Morton, who had little originality, drew largely. Morton also wrote a *Synopsis of the Church History of Plymouth* (1680) and obituary poems of the style then in vogue.

MORTON, Oliver Perry (1823–77). An American political leader, best known as the War Governor of Indiana. He was born in Salisbury, Wayne Co., Ind., Aug. 4, 1823, attended the Wayne County Seminary, spent two years at Miami University, studied law, and in 1847 was admitted to practice. He soon became a prominent member of the Indiana bar, and in 1852 was elected circuit judge. He entered politics as a Democrat, but opposition to the Kansas-Nebraska Bill led him on May 2, 1854, to withdraw from the Democratic State Convention: and ultimately he assisted in the formation of the Republican party, to whose first national convention he was a delegate. In 1856 the People's party, as the Republican party in Indiana was at first called, nominated him for Governor, but after a close contest he was defeated. Four years later he was elected Lieutenant Governor, and, upon the Governor's election as United States Senator, Morton became Governor, Jan. 16, 1861. Upon the outbreak of the Civil War he threw himself with extraordinary energy and success into the work of raising troops. The election of 1862, however, resulted in the choice of a Democratic Legislature and Democratic State officers, who bitterly opposed the war and threw obstacles in his way. His task was still further complicated by the presence in the State of a large secret society called the Knights of the Golden Circle (q.v.), which resisted the draft, encouraged desertion, and even plotted the assassination of the Governor and the carrying of Indiana out of the Union. But Morton triumphed over all difficulties. He borrowed sufficient money on his own personal responsibility to meet the exigencies of the situation; put down the treasonable associations and brought the leaders to trial; and he secured the triumph of his party and his own reëlection as Governor in 1864. In the opinion of such men as Chase and Stanton his services during this period were greater than those rendered by

any other of the great war governors. Shortly after the close of the war Morton was stricken with paralysis and was obliged to go to Europe. On his return to the United States he resumed his duties as Governor. In 1867 he was elected United States Senator and was reëlected in 1873. In the Senate he became a recognized leader of the Republicans and, despite his poor health, accomplished a prodigious amount of work, serving on the committees on foreign relations, agriculture, military affairs, private land claims, and privileges and elections. At first an opponent of suffrage for the freedmen, he ultimately did much to promote the passage of the Fifteenth Amendment. He was one of President Grant's chief advisers, and sustained the administration in the unsuccessful attempt to carry through the Senate the proposed treaty for the annexation of Santo Domingo. In return for this last service the English mission was offered to him, but he refused it. In 1873, on the death of Chief Justice Chase, he declined also to become Chief Justice of the Supreme Court. At the Republican National Convention in 1876 he was a strong candidate for the presidential nomination and received 124 votes on the first ballot. He subsequently served on the Electoral Commission (q.v.). At this time his infirmities were such that he required assistance in moving about, and had to be carried from the lobby of the Senate chamber to his carriage. He died at Indianapolis, Nov. 1, 1877, as the result of an attack of paralysis. Morton possessed a powerful intellect, a determined will, and high executive ability, and was an orator of great popularity and force. An admirable biography has been written by W. D. Foulke (2 vols., Indianapolis, 1899).

MORTON, Paul (1857–1911). An American financier and railroad and cabinet official, son of Julius S. Morton, born at Detroit, Mich. He was educated in the public schools of Nebraska City, was then employed as clerk by the Burlington and Missouri Railroad and later in the freight and transportation department of the Chicago, Burlington, and Quincy, where he was promoted eventually to be general freight agent. From 1890 to 1896 he was vice president of the Colorado Fuel and Iron Company and of the White Breast Fuel Company. In 1896 he was made third vice president of the Atchison, Topeka, and Santa Fe Railroad, and in 1898 second vice president, with charge of the freight traffic. During his eight years' incumbency he became widely known for his ability in handling transportation problems. In politics he was a stanch Democrat until 1896, when he became a Republican on the silver issue. In 1903 Morton became prominent because of his fearless testimony regarding railroad rebates, which were then under general investigation by the Federal authorities. His conduct received the attention and approval of President Roosevelt, who in 1904 appointed him Secretary of the Navy; in this capacity he served for a year. He was invited, after the Armstrong Committee investigation in 1906, to become president of the Equitable Life Assurance Society. He reorganized this company and brought about meetings of the executive officers of other organizations to provide uniform rates and tariffs. See Hyde, Henry Baldwin; Hyde, James Hazen; Life Insurance.

MORTON, Samuel George (1799–1851). An American physician and natural scientist, born in Philadelphia. He studied medicine under Dr. Joseph Parrish and was assisted by Dr. Richard Harlan, the natural historian, from whom he gained a strong taste for general science. He graduated M.D. from the University of Pennsylvania in 1820, and after three years of European study received a degree from Edinburgh University. Beginning practice in Philadelphia in 1824, he soon attained a prominent position. In 1839 he was appointed professor of anatomy in the University of Pennsylvania, which chair he continued to fill until 1843. While abroad Morton studied the geology of Scotland, and on his return presented to the Academy of Science a collection of the greenstone rocks of that country. In 1827 he published an *Analysis of Tubular Spar from Bucks County*, in 1828 *Geological Observations*, and in 1834 *Synopsis of the Organic Remains of the Cretaceous Group of the United States*. He was besides an ethnologist of wide note, the author of *An Inquiry into the Distinctive Characteristics of the Aboriginal Race of America* (1840; 2d ed., 1844) and of *Some Observations on the Ethnography and Archæology of the American Aborigines* (1846). The owner of a very large collection of skulls from all races of the world (now in the museum of the Philadelphia Academy of Natural Sciences), Morton wrote: *Crania Americana* (1839); *Catalogue of Skulls of Man, etc.* (1840; 3d ed., 1849); *Crania Egyptica* (4 vols., 1844); etc. His medical works include: *De Corporis Dolore* (1823); *Illustrations of Pulmonary Consumption* (1834); an American edition of Mackintosh's *Principles of Pathology and Practice of Physic* (1836; 4th ed., 1844); *An Illustrated System of Human Anatomy* (1849). In still another field were his *Hybridity in Animals and Plants* (1847) and *Additional Observation on Hybridity* (1851). Consult C. D. Meigs, *A Memoir of Samuel George Morton* (Philadelphia, 1851).

MORTON, Thomas. See Morton, John Maddison.

MORTON, Thomas (1564–1659). An English prelate and controversialist, born in York and educated at St. John's College, Cambridge. He was ordained a priest in 1594 and became chaplain to Lord Huntingdon. Upon the death of Elizabeth he became chaplain to the Earl of Rutland. In his first work, *Apologia Catholica* (1605), he defended the Church of England and attacked the Jesuits, which he continued to do throughout his life. A royal chaplain, he was also successively Bishop of Chester (1615–18), of Lichfield and Coventry (1618–32), and of Durham (1632–59). Morton was one of the outstanding figures of the Church of England at a time when firmness and moderation in her bishops were needed to win Puritans and Catholics to her fold and to loyalty to the crown. His opposition to Catholic doctrine was unyielding, although while Bishop of Chester he appeased the Catholic laity by allowing them Sunday amusements. As a controversialist he was thought worthy to enter the lists with Cardinal Bellarmine (q.v.). Towards Protestant nonconformists he was more liberal. He had no sympathy with Archbishop Laud (q.v.) and was even willing to meet the Presbyterians half way by admitting that ordination by presbyters was valid in cases of necessity. When the Parliament was victorious against Charles I, Morton had to meet his share of the popular odium against the Established church. In 1641 he was mobbed by the people and was one of the 12 bishops impeached, though on slight grounds,

by the Parliament for high treason. Morton suffered four months' imprisonment and never resumed his seat in the House of Lords. The last years of his life were spent in the household of an old friend, Sir Christopher Yelverton. His works include: *A Treatise of the Threefolde State of Man* (1596); *An Exact Discoverie of Romish Doctrine* (1605); *A Defence of the Innocency of the Three Ceremonies of the Church of England* (1609); *A Catholic Appeal for Protestants* (1610); *The Grand Imposture of the Church of Rome* (1628); *The Necessity of Christian Subjection* (1643); *Ezekiel's Wheels: A Treatise Concerning Divine Providence* (1653); *A Treatise of the Nature of God* (1669).

MORTON, Thomas (c.1590–1646). An English adventurer, by profession an attorney. He visited New England with Weston's expedition in 1622, and in 1625 he returned with Captain Wollaston's colony, which settled at Mount Wollaston, within the present limits of Quincy, Mass. After Wollaston's departure to Virginia the next year, Morton ousted Fitcher, who had been left in charge, and changed the name of the settlement to Ma-re-Mount or Merry-Mount. He began to trade with the Indians, and the settlement became the rendezvous for the reckless and dissolute. In 1627 he erected a Maypole 80 feet high, and the revels lasted for days. When this and the fact that he was supplying the Indians with firearms in defiance of King James's proclamation of 1622 became known at Plymouth, a remonstrance was sent to him. In 1628 he was captured by Capt. Miles Standish and sent back to England with charges. There he ingratiated himself with Sir Ferdinando Gorges. Meanwhile Endecott visited Merry-Mount, cut down the Maypole, and renamed the place Mount Dagon. In 1629 Morton returned to Plymouth and to Merry-Mount. In 1630 he was again arrested after several unsuccessful attempts, and was placed in the stocks, while his house was burned and his property seized, on a charge of disorderly conduct and oppression of the Indians. When sent to England he again joined the Gorges claimants and furnished much information against the Massachusetts Colony. When the New England Council surrendered its charter in 1635 and divided the territory, Morton was appointed solicitor to press the confirmation of the deeds and the revocation of the Massachusetts charter. Only want of money prevented the destruction of the Colony. In 1637 he published the *New English Canaan*, which had probably been written in 1634–35. The first part is an account of the Indians, the second a description of the country, and the third a confused, somewhat humorous account of the "precise separatists" of Plymouth and Massachusetts Bay. In 1643 he again appeared in Plymouth and remained through the winter. He then appeared in Maine and Rhode Island. In 1644 he was captured by the Massachusetts authorities, kept in prison a year, and fined £100 on charge of having made a complaint of the Colonies to the council. He was released without payment of the fine, and died in Maine. Morton's life and his settlement at Merry-Mount form the subject of John Lothrop Motley's novels, *Morton's Hope* (1839) and *Merry-Mount* (1849), and one of Hawthorne's short stories is entitled *The Maypole of Merry-Mount*. Motley's book has been reprinted with an elaborate memoir and full notes by C. F. Adams, in the "Prince Society Publications," vol. ix (Boston, 1883). Consult C. F. Adams, *Three Episodes of Massachusetts History* (2 vols., Boston, 1893).

MORTON, Thomas George (1835–1903). An American surgeon. He was born in Philadelphia, graduated M.D. from the University of Pennsylvania in 1856, and practiced in his native city. During the Civil War he was actively engaged in the establishment of hospitals and as consulting military surgeon in Philadelphia. After the war he paid special attention to orthopedics. He was the first to describe metatarsalgia (Morton's disease) in 1876—*A Peculiar and Painful Affection of the Fourth Metatarso-Phalangeal Articulation.* Among his writings are "Transfusion of Blood, etc.," in Seguin's *Series of American Clinical Lectures* (1877) and, with W. M. Hunt and others, *Surgery in Pennsylvania Hospital* (1880).

MORTON, William James (1845–). An American physician, son of William T. G. Morton. He was born in Boston and graduated at Harvard in 1867 and at Harvard Medical School in 1872, taking the Boylston prize for his thesis on Anæsthetics. From 1873 to 1874 he studied at Vienna, going from there to Kimberley in South Africa, where he built up a practice and engaged in diamond mining. After two more years of European study he settled in New York. Here he was for a time editor of the *Journal of Nervous and Mental Diseases;* was adjunct professor of nervous diseases at the New York Postgraduate Medical School from 1882 to 1885. In 1890 he became professor of nervous diseases and electrotherapeutics at the New York Postgraduate Medical School. His name is connected with advances in electrotherapeutics. In January, 1913, with Julian Hawthorne (q.v.), he was convicted of fraudulent use of the mails in promoting worthless Canadian mines, and was sentenced to serve in Atlanta Penitentiary, his term to expire a year and a day from the beginning of the trial (Nov. 25, 1912). Released in October, he was later pardoned by President Wilson, had his civil rights restored, and was readmitted to practice.

MORTON, William Thomas Green (1819–68). An American dentist, probably the first to recognize the general anæsthetic properties of sulphuric ether. He was born at Charlton, Mass. In 1840 he took up the study of dentistry at the Baltimore College of Dental Surgery, then recently established by the new Society of American Dental Surgeons. On his return to Boston in 1842 to practice Morton's attention was drawn towards medicine, and in 1844 he began study with Dr. Charles T. Jackson, of Boston, and continued in Harvard Medical School. He did not complete his course, but was afterward awarded an honorary M.D. by the present College of Physicians and Surgeons, Baltimore. The art of dentistry was at that time in a transition stage, and Morton's inventive genius devised many improvements, especially a new solder by which teeth could be attached to gold plates. In Dr. Jackson's laboratory Morton became acquainted with the value of sulphuric ether as a local anæsthetic and used it first in dental operations. After a series of experiments on animals, he finally succeeded in proving the efficacy of vaporized ether as an anæsthetic during the extraction of teeth. Previously anodynes had been used—alcoholic stimulants, laudanum, and the galvanic current. Making known his results to Dr. John C. War-

ren, he administered ether at the latter's request in the Massachusetts General Hospital on Oct. 16, 1846, the operation being that of removing a tumor from the jaw. At the suggestion of Dr. Oliver Wendell Holmes the new form of narcosis was called anæsthesia, and Dr. Henry J. Bigelow reported the discovery in the *Boston Medical and Surgical Journal* on Nov. 18, 1846. Dr. Morton obtained a patent for the use of ether, under the name of letheon, in 1846, a month after the operation in the hospital, and a month after this another patent, in England. Dr. Jackson also claimed the honor of having made the discovery. The French Academy awarded 2500 francs each to Jackson and Morton, but the latter declined to accept his share. However, in 1852, he received the Montyon prize in medicine and surgery. Congress offered him $100,000 for his patent, but he refused to sell it, and became involved in many suits with the government and individuals. In fact the rest of his short life was spent in futile contests, literary and legal, in regard to his patent. He was the father of William J. Morton (q.v.).

MORTON'S DISEASE. See METATARSALGIA.

MORTON'S FORK. A famous dilemma said to have been proposed by the chancellor of Henry VII of England, John Morton (q.v.). In 1491 Henry resorted to the unconstitutional method of obtaining money by a benevolence (q.v.), and Morton in carrying out the scheme is supposed to have told those who lived well that their opulence was proved by their large expenditure; while those who spent little were told they must have saved considerable by their economy. Either class could well afford to assist the sovereign.

MOR'TUARY CUSTOMS. Observances connected with death and burial. The care of the dying and of the dead is a marked feature of religion among all peoples, from the lowest to the highest, and is associated most closely with spirit belief and custom. It is possible to treat the subject ethnically, enumerating and classifying peoples by their mortuary customs, or culturally, studying the genesis and development of each class of actions and beliefs involved. The latter method is here adopted. Mortuary customs, for the convenience of study, may be considered under the following heads, which by their characteristics as well as by their presence or absence are worthy of note.

1. Customs concerning the dying.
2. Treatment of the corpse, including the posture of the body, bathing, cutting, decapitating, embalming, or cremating the corpse, or scraping the bones.
3. Clothing or wrappings of the corpse.
4. Incasement of the corpse in the crate, basket, jar, box, or other receptacle which may answer to the coffin. In this, protection and convenience of carrying are the ends desired.
5. Watching the corpse, including the wake and funeral feast.
6. Bearing the corpse to the place intended for it, the funeral, with all its apparatus, processions, and rites.
7. Disposal of the corpse.
8. Post-mortem ceremonies, passing under the general term "mourning."
9. Cult of and for the dead, beliefs about the dead, the ghost, necromancy.
10. Memorials for the dead, mementos preserved or worn, and monuments of every kind.
11. Ascriptions to the dead, epitaphs, mortuary sayings, and literature.

Customs Concerning the Dying. In the belief of many of the lower races death from natural causes is a thing unknown; it is always the act of some god or personage, designed and chiefly malevolent. Every disease and every death among the Polynesians is held to be caused by the gods for some crime against taboo or as the result of some offering by an enemy. Hence the neglect and cruel treatment of the sick. Even death caused by poison is thought to be due to the displeasure of the gods.

Care for the dying can scarcely be said to exist among savages, although the most strenuous efforts of the magician and friends are put forth to exorcise the destroying spirit and thus to restore the patient. The moment hope has departed, the preparations for burial are begun almost before the breath has left the body. So strong is the belief in the necessary connection between magic and death among the Australians that when a man believes he has been "pointed at" or run through with a magic spear that has been "sung" he is likely to die. Well-authenticated cases are on record in which the slightest ailment or wound has resulted fatally because the victim was convinced that the instrument had been charmed by magic. For many forms of conjuring there is no remedy. In others a cure is possible by the aid of a magician belonging to the totem of the person who "pointed" at the sick man. The practices of the medicine men are almost universally the same. They make the same passes, suck the wound, and mutter incantations, and the imagination of the patient often effects a cure.

Treatment of the Corpse. No sooner has life become extinct than the preparation of the body begins. For economy's sake most primitive tribes double the corpse into the smallest compass, the chin resting on the knees. Even among such an advanced people as the ancient Peruvians this custom of packing the body into the smallest compass prevailed, a strong rope being used to draw the limbs into place and bind them fast. It has been said that the motive in this is to imitate the posture of the unborn infant, but aside from the fact that crouching is a common position in life among savages, economy of space in the grave or tomb has much to do with the custom.

Embalming the dead was at first only a natural process. There are regions where the arid climate desiccates all flesh, as on the western plains of the United States and in Peru, Egypt, and Arabia. The drying up of the body suggested to the primitive mind religious ceremonies which found their culmination in the all-absorbing mortuary cult of Egypt. The Polynesians when first discovered had an elaborate ceremony of embalming their dead priests. The brains and intestines were removed, and all moisture was carefully wiped from the body, which was anointed with fragrant oils and dried in the sun. It was then clothed and seated in a little house erected for the purpose, where a table was set before it for food, fruits, and flowers. Here also belong such ceremonies as calling the dead, anointing, closing the eyes and lips, bathing, kissing, placing coin in the mouth, all of which have symbolical meanings with reference to the future well-being of the dead, as well as to the immediate relations of the ghost with the living.

Clothing or Wrappings of the Corpse. Scarcely any people consigns its dead to the last resting place naked. The corpse is clad either

with the clothing worn in life, or the best attire, or special grave cloths, shrouds, or winding sheets. Furthermore, masks are frequently placed over the whole body or over the face. Among the very lowest peoples the corpse may be put away naked, but this takes place only among those tribes that wear no clothing. The preparation of a special shroud has its prototype even among very primitive races, and begins with the chiefs or leading men, who in life wear an official or professional dress. The order of the development of cerements seems to have been: first, the disposal of the body naked; second, dressing the corpse as in life in order to take up the new life in the spirit world at once; third, arraying it in its best clothing, to make a good impression on the ghosts among whom it goes; fourth, wrapping it in a shroud for sentimental reasons. Among the Egyptians the corpse was wrapped with narrow strips of linen. In Turkestan a similar practice is now in vogue, in Kimbondo leather is used, and in Mashonaland the toes and fingers are tied up each in a separate piece of cloth.

Incasement of the Corpse. The receptacles for the dead body are of many sorts. Among the ancient Aleuts the corpse was doubled up and fully clothed. It was then crated, hung on the wall of a cave, or set in a safe place on the floor. The Eskimo employ tough walrus hide as a case for the dead. The Pacific coast tribes, wherever the giant cedar grows, make boxes or hollow logs for the corpse. The plains Indians crated the bodies of the dead and all their belongings before placing them on the platforms, and the old cave people of Utah packed them in burden baskets.

The southern Indians made hurdles of cane and rolled them about the corpse. Farther south no coffin was needed, for the bodies were exposed in *quiobogons*, or dead houses, until the flesh was gone, after which the bones were buried in the earth or in jars. Some of the ancient mound builders made a stone box or coffin in the grave for the bones.

A common motive among primitive tribes in using the coffin was to hold the bones together for burial. Custom demanded it and the ever-watchful and jealous ghost required it. Again, the coffin or its substitute guarded the corpse from ravenous beasts and birds of prey, and it may also be possible that among some tribes the dead are boxed up to prevent them from escaping or being spirited away by unfriendly ghosts. In many tribes the habitation motive prevails; the coffin or tomb is regarded as the house of the dead.

Watching the Corpse. Between death and burial the spirit or the double of the dead hovers around the body and expects the most rigid adherence to custom. This belief is the origin of the widespread custom of lykewake, or watching the corpse. Among many primitive tribes the dead are not hurried to burial, but the ceremonies of mourning begin around the corpse. The Polynesians placed the body of the dead on a bierlike frame covered with white tapa, which was decorated with flowers, or upon a bed of fragrant leaves. Relatives sat around lamenting and cutting themselves with sharks' teeth. Vigils about the dead are widespread among the white races. The folklore of the civilized world abounds in customs during the day or two that intervene between death and burial. The watch feast, or wake, has dwindled to a company of a few friends. Salt is placed on the breast of the dead, a candle burns night and day at the head of the coffin. The sin eater takes bread and publicly devours it for the misdeeds of the deceased.

Removing the Corpse to the Place Intended for it. The funeral proper is one of the most solemn of rites the world over. Among many tribes the corpse must be taken out of the dwelling through the roof or by some roundabout way, in order that the ghost may get bewildered and not return. The procession to the grave, among savages, has changed little in the course of centuries. Usually, mutilations of a more or less cruel character are then observed by certain persons, while among other tribes only a small number carry the dead away and are thereafter unclean.

Disposal of the Corpse. The disposal of the corpse does not necessarily mean interment. We may distinguish five methods which have undergone countless modifications as outgrowths of race, climate, soil, and grade of culture. 1. *Exposure.*—The bodies are not sealed up, but are left to destruction on the ground (rare), or are hidden in clefts, caves, or grottoes; in the hut where the death took place; on trees, posts, scaffolds, or platforms; in boxes or canoes; in log pens, or dead houses; or in towers of silence. 2. *Aquatic Burial.*—The corpse is placed on the water or under the water, as among the Hindus, who consign dead bodies to the Ganges. 3. *Inhumation.*—The corpse is buried in a single grave, which is often shelved or recessed; in pits or golgothas; in cairns, or under mounds or tumuli; under the floor of the home or in consecrated structures. 4. *Encystment.*—The body is inclosed in rude boxes of wood, stone, or other materials, which are placed in dolmens, vaults, sepulchres, house tombs, cistvaens, or mausoleums. 5. *Cremation.*—The corpse is burned and the ashes are abandoned, scattered, buried, boxed, or inurned.

In this connection belongs the custom of making deposits with the dead. No other part of this complicated series of customs comes so near to the world of shades. Thus, in Dahomey the bodies of wives and slaves were sacrificed without number, and in the days of knighthood the horse and armor accompanied the warrior. It is through these relics found with the dead that archæology is to a large extent possible. Most extinct peoples were without the art of writing; but stone implements, pottery, objects in bone and metal, and even textile fabrics reveal enough to enable the archæologist to reconstruct ancient society. Among some American tribes articles of use were punctured or broken before being placed in the grave. One of the tribe who robbed a grave would not be tolerated, but an inimical tribe might be tempted. The Polynesians would rob sacred inclosures of the enemies' dead in time of war and steal the bones of distinguished men to make tools, fish hooks, and other degrading implements. To avoid this, bones were carried to the caverns far away and hidden in clefts of rocks. In the Fiji Islands favorite wives as well as slaves were strangled on the death of a chief in order that they might wait upon him and be happy with him in the spirit world. To this they gladly submitted, not only in the prospect of greater happiness, but to avoid unspeakable miseries in after life. See BURIAL; CREMATION OF THE DEAD.

Post-Mortem Ceremonies. These may be

grouped together under the general head of mourning, including both what is done and what is left undone in dress, conduct, etiquette, and rites. As soon as a burial takes place among the Australians and other savage races the camp is burned down, everything in it is destroyed, and the people move to another place. During the mourning period no person may mention the name of the dead except in case of necessity, when it must be done in a whisper for fear of annoying the ghost. If the ghost should hear the name mentioned it would come to the conclusion that the relatives were not properly mourning, and they would be in consequence liable to his vengeance; for, if their grief were genuine, it would cause them too much pain to hear his name mentioned to allow them to speak it.

Many seemingly absurd customs about the graves or tombs of the dead are easily explained when it is kept in mind that the dead are not regarded as really dead. Putting rags or parts of torn clothing about the tombs, or on trees near by, as a notice to the ghost that the appropriate rending of garments had taken place, is one of these customs. A complete list of them would fill a volume. It is enough to mention the tolling of bells, choice and fashions of mourning, cutting one's flesh, calling the dead, turning pictures towards the wall, feeding the dead, scrupulous care of the grave, hired mourners, and the imperative customs as to who shall mourn, when, how long, and how, sacrifices at the grave, naming the dead, and the widow's lot.

Cult of and for the Dead. The ghostly world of savages is never far away. The anthropomorphism of nature does not end with this life. The dead go at once to some place on the earth or under the earth where the most congenial occupations are renewed. When the ghost of the Polynesian leaves the body it is drawn out through the head as the sword is pulled out from the scabbard. Evil powers also lie in wait for the ghost to seize it when it is drawn out. Arriving safely at the place of the blessed, it is devoured by the gods, cannibalism being in full vogue above.

Not in savagery only, but in all races, ages, and grades of culture, this belief in the nearness of lost ones is held. More than this, reincarnation and metempsychosis are believed to be possible. The savage woman complacently murders her babe, thinking that the same one will enter into the mother's womb and be born again. As the dead are not considered dead, but are even more powerful as ghosts than they were as men, a complex and wide-reaching cult of almost universal extent has been evolved, which has for its object the propitiation and gratification of the spirits of the dead. See DEMONOLOGY; GHOSTS.

Memorials for the Dead. Combined with the fear of the dead is a desire, primarily, perhaps, based on anxiety to propitiate the ghost by a proof of suitable mourning and later founded on real affection, to preserve the memory of the departed. The Andamanese widow carefully dries the skull of her deceased husband, paints it with ochre, decorates it with rude lacework, and wears it for a memorial about the neck. Analogous synecdochic preservation of the dead is almost universal among primitive peoples. The Eskimo place by the side of the grave the huge jaw of a whale. The northern Pacific tribes set up great posts of cedar. The ancient people of the Mississippi valley built mounds of earth and stone. In Easter Island images cut in lava were memorials. The Tahitians set up little models of their houses about 6 feet high, where the body of a chief clothed and rubbed with aromatic substances was laid while offerings were made. These all tell the same story. As culture advanced monuments (see MONUMENT) became more elaborate, and the modern cemetery differs from the primitive memorials in degree rather than in kind.

Ascriptions to the Dead. The custom of eulogizing the dead is extremely primitive and ancient. The Polynesians had professional bards who composed elegies which were committed to memory and preserved. These were recited on special occasions when the dead were mentioned. The American Indians had a solemn style of speech for such occasions quite above the grasp of the ordinary man, while the great epics of Greece and Rome abound in passages over the dead of deepest pathos. Here, too, belongs the entire body of epitaphs, or memorial inscriptions placed on tombs in honor of the dead who are laid in them. See EPITAPH.

A summary of the ethnographic data has been begun by Frazer in *The Belief in Immortality; and the Worship of the Dead*, of which vol. i (New York, 1913) deals with Australia, the Torres Straits, New Guinea, and Melanesia. For North America, consult Yarrow, "Mortuary Customs of the North American Indians," in *Bureau of American Ethnology, First Annual Report* (Washington, 1881).

MORUNGEN, HEINRICH VON. See HEINRICH VON MORUNGEN.

MORVEAU, LOUIS BERNARD GUYTON DE. See GUYTON DE MORVEAU, L. B., BARON.

MORVI, môr-vē'. A native Gujarat state of Bombay, India, on the north side of the Kathiawar Peninsula. Area, 822 square miles (Map: India, B 4). Two-fifths of the land is under cultivation, producing grain, sugar cane, and cotton. Salt and cotton textiles are manufactured. The chief port is on the Gulf of Cutch. Pop., 1911, 14,962. Capital, Morvi.

MORYSON, mŏr'ĭ-son, FYNES (1566–1630). An English traveler, remembered for the partial account of his travels—he sojourned in Ireland, Scotland, several countries of Europe, and in the Holy Land—entitled *An Itinerary* (1617), planned to be in five parts, only three of which were originally printed, the fourth part being preserved in manuscript in the library of Corpus Christi College, Oxford, and a portion of it getting into print in Charles Hughes's *Shakespeare's Europe* (1903). The value of the work to social historians led to the reprinting of other portions of the *Itinerary*—in *History of Ireland 1599–1603* (1735) and in the *Carisbrooke Library* volume (edited by Henry Morley), *Ireland under Elizabeth and James I, Described by Spenser, Sir John Davies, and Fynes Moryson* (1890).

MOSAIC, mō-zā'ĭk (ML. *mosaïcus*, Gk. *μουσαῖος, mousaios*, mosaic, artistic, relating to the Muses, from *μοῦσα, mousa*, Muse). A branch of fine art which was especially prominent during the Middle Ages, though not unknown to antiquity, and is still practiced to a limited extent. Mosaic work, when it attained full growth, had various branches. It was used: (1) on floors; (2) on walls; (3) on detached objects, monuments or furniture. It consisted of the grouping of pieces of marble, glass, or enamel so as to form ornamental or figured compositions. In the *opus sectile* the thin marble plates

were cut so as to follow the outlines of the design, and it is not properly a branch of mosaic. *Opus tessellatum* is the technical term usually applied to mosaic of small cubes (tessellæ) of marble or stone in simple patterns, usually used for pavements. For wall compositions, architectural details, and furniture, though marbles were at first used almost exclusively, the possibility of producing a greater variety of shades in artificial enamels led to their exclusive use on walls as early as the fifth century and in furniture after the eleventh century. The term *opus musivum* is usually applied to such work on wall and ceiling. The cubes used for figures were usually smaller than those used for decorative work. Some are as small as 3 millimeters, more than 100,000 being contained in a square meter. Gilt cubes were made by inclosing the gold leaf between two pieces of white glass. The cubes were colored with metallic oxides. Colored glass was first cut into long narrow sticks and these again broken into the cubes, which were sorted into their separate cases, according to colors and shades, like printers' type. To execute a wall composition the mosaicist prepared his cartoons; the mason plastered as large a section of the wall as could be covered in a day; the mosaicist stenciled or dotted his cartoon on the wet plaster and then rapidly fastened to it the mosaic cubes. The surfaces were flattened, washed, and burnished. In the best work the cubes are not absolutely even or adjacent, so that mechanical effects are avoided.

Early History. Both the Egyptians and Assyrians used mosaic in jewelry and furniture, particularly on ivory grounds. Mosaic designs were used by the Egyptians and also by the Greeks to embellish columns, tiles, and various architectural members. The earliest survivals of Greek mosaics at Delos and Olympia date from the Roman period. They came into prominence for the reproductions in permanent form of famous paintings on the floors of public and private buildings, a practice which the Romans learned from the Greeks. We even hear that scenes from the Trojan War were represented on floors of the great ship of Hiero of Syracuse. A famous floor at Pompeii represents in a grand composition a scene of Alexander's victory at Issus, full of action and variety. Even larger and more complicated is the Nile scene of a floor found at Palestrina, with its inundated city, its fishing and other genre scenes.

Roman. Although the Romans were not ignorant of the use of glass cubes on walls, they never developed this branch of mosaic work; the fountains and niches at Pompeii and Ostia are almost the only surviving examples. But in their pavements they showed the greatest variety, from the simple crude geometric designs in black and white to the exquisite gradations of color and form in such works as the Capitoline doves, the landscapes from Hadrian's villa in Rome and Berlin, the Pompeian actors by Dioscorides in Naples, the portraits of poets and philosophers at Cologne, and many more. Midway between stand such colossal works as the gladiator pavement of the Baths of Caracalla. Roman mosaic pavements of artistic value have been found not only throughout Italy, but in France, Spain, Germany, Hungary, north Africa, Syria, and Asia Minor.

Early Christian. In the fourth century Christian artists perceived the value for church interiors of the rich coloring and permanency of mosaic. No form of painting harmonizes so well with architecture. Mosaics were placed nearly always in the apses and on the triumphal arches of the early Christian basilicas, and in important cases upon the walls of the nave, and sometimes both on the inside and outside walls of the façades. The interiors of mausoleums and baptisteries were covered with them on dome, walls, and apse. While the upper part of the walls was decorated in this way with figured mosaic composition, the geometric mosaics or *opus sectile* were used on the dadoes below, and the marble geometric mosaics covered the floors. In the later Middle Ages the twisted columns, sepulchral monuments, altar canopies, pulpits, choir screens, and other details were entirely inlaid in geometric designs, in the East and in Italy. The wealth of works is concentrated in Italy and in the purely Hellenic world. Rome and Ravenna had special schools with offshoots at Naples, Milan, Grado, and Parenzo. Constantinople and Thessalonica, also, were independent centres, radiating over Greek lands.

Rome preserves the earliest Christian works at Santa Costanza, similar to catacomb frescoes, and at Santa Pudenziana the counterpart of the Christian sarcophagi with Christ and the Apostles. The earliest series where mosaic painting attempts a great scheme of subjects taken from the Old and New Testaments is in Santa Maria Maggiore in Rome, on apse, triumphal arch, and nave. The mosaics over the chancel arch of St. Paul's, representing subjects from the Apocalypse, date from the fifth century. In both cases the composition is still confused; the art has not yet found itself. It was from Greek artists that the solution came, in the introduction of the uniform gold background, against which the figures stood out clearly, as compared with the old white ground. At Ravenna we see this style in its earliest glory in the two baptisteries (fifth century), and especially in the mausoleum of Galla Placidia (440) and later in the church of Sant' Apollinare Nuovo (c.500–550). The latter monument has its entire main walls covered with a triple row of mosaics. Thoroughly Greek also is the culminating work of the sixth century, the decoration of San Vitale, also at Ravenna, with its two great historic panels of Justinian and Theodora, the Byzantine court and the ecclesiastical grandees.

Meanwhile the Roman school had somewhat fallen from its supremacy, for the only great work after St. Paul's was the mosaic of saints Cosmas and Damianus (530), after which Rome suffered from the wars between the Goths and Byzantines and the attacks of the Lombards. The decline reached Ravenna in the seventh century, as is shown at Sant' Apollinare in Classe, and continued in Rome, with Italo-Byzantine stiffness, as in the works at San Lorenzo, Sant' Agnese, and San Venanzio. The coloring is still superb, but the figures are rigid and staring.

Mediæval. The Carolingian era saw a revival in both East and West about the year 800, which lasted for less than a century in Italy, but continued in the East from Basil the Macedonian to the capture of Constantinople by the Crusaders in 1204. In Rome the mosaics of the church of Santa Prassede, especially the scenes from the Apocalypse, are a masterpiece, while Santi Nereo ed Achilleo and San Marco are of secondary importance. The art did not then spread beyond Rome, as in the earlier period. Only in the Orient was it still supreme. The

real revival of the art in the West came in the eleventh century and was due to Byzantine influence and imported Byzantine artists. The two great schools were that of Sicily and Campania, with its masterpieces of Cefalù, Palermo, and Monreale, and that of Venice, represented at San Marco, Torcello, and Murano. In variety of subject, in splendor of color, and in sheer amount, these works surpass the mosaics of the fifth and sixth centuries.

The Roman school took part in this revival, but mingled antique traditions with Byzantinism, and retained a freedom and beauty of decoration and detail foreign to the other schools. It can best be studied at San Clemente, Santa Maria in Trastevere, Santa Maria Maggiore, and St. John Lateran. In some of these works we can trace the first steps in the great revival of painting usually connected with the names of Cimabue and Giotto.

Meanwhile the mediæval mosaicists had been executing pavements far more beautiful than any geometric floors of antiquity. The Byzantine school, as usual, took the lead, and the exquisite designs and coloring of the pavements of San Marco and the Torcello Cathedral at Venice are but repetitions of the pavements of the churches of Constantinople, Saloniki, Mount Athos, Chios, and elsewhere. The Italian school, though centring at Rome, did similar work in Campania and Sicily. The small marble cubes were worked in patterns around large circular, square, long, or polygonal slabs of porphyry, serpentine, verde antico, rosso antico, or other rich marbles which formed the centre of each design.

It was not long before the geometric designs of the floors were transferred to the various details and objects in the church interiors, thus forming a perfectly harmonious whole. The altar fronts and canopies at Ferentino, the canopies at Santa Cecilia and San Paolo at Rome, the choir seats at Cività Castellana and San Lorenzo at Rome, the pulpits at Alba Fucense, San Lorenzo, Palermo, Salerno, and Ravello, the choir screens at the two latter cathedrals and at Alba, the Paschal candlesticks at Anagni, Ferentino, Santa Cecilia, and Salerno, the episcopal thrones at San Lorenzo and Fondi, the sepulchral monuments at San Francesco in Viterbo, at the cathedral of Perugia, at Orvieto, at Assisi, Rome (Santa Maria Maggiore, Sopra Minerva, Ara Cœli, etc.), are a few among hundreds which made the interiors of churches wonderfully rich in this part of Italy.

The mosaic in geometrical patterns even invaded the field of architecture. The portals were surrounded by it; it formed the main decoration of the colonnaded porticoes, and even of the cloisters. The cloisters of San Paolo and of the Lateran at Rome would lose all their beauty if their columns and friezes were divested of the color and design given them by mosaics. Even Tuscan church architecture felt this influence to the extent of obtaining a faintly similar effect by *opus sectile* with broader design—as at Pisa (baptistery) and San Miniato, near Florence.

None of the European countries besides Italy and Greece used mosaics. An occasional work is found in Germany, France, or England; but, as at Westminster Abbey, it is the work of an Italian or a Greek. Only in Russia, as at Kiev and Novgorod, can we trace the existence of a regular branch of the art.

Mohammedan. The art passed from the Byzantine Greeks in the East to the Mohammedans and was used by them for pavements and the revetments of walls in nearly all the schools, especially in Egypt, Spain, and Syria. Figured mosaics were substantially forbidden by the law of the Prophet, so that decorative, and especially geometric, patterns were alone used. Mosques, fountains, palaces, baths, and other buildings, between the tenth and fifteenth centuries, had them in profusion. The mosques of Cairo (see MOSQUE) contain an unbroken series which is paralleled in the old Coptic churches of the city. It is probable, in fact, that most of the mosaicists of the mosques were Christian Copts. The Alhambra at Granada contains dadoes of this geometric ornament, though here and in Syria, and especially in Persia, it was less used than the enameled tiles.

Renaissance and Modern. With the rise of the Giottesque school early in the fourteenth century the golden age of mosaic painting ended, frescoes taking its place. Such works as appear on the façades of Orvieto and Siena cathedrals by Orcagna and his contemporaries in the fourteenth century are purely decorative. Henceforth mosaic loses its individuality and seeks to imitate the delicate soft tones of fresco and then of oil. Great artists like Raphael (Santa Maria del Popolo, Rome), Titian, and Tintoretto (San Marco, Venice) furnished cartoons to be carried out by mosaicists, who are no longer artists, but mechanics. The atelier of the Vatican, busy producing altarpieces for St. Peter in exact imitation of masterpieces in oils, multiplying shades and minimizing the size of the mosaic cubes, has perfected this mechanical method. The atelier at Venice is the only other modern centre of importance. These modern artisans, in their restorations of mediæval mosaics, have done immense damage by trying to improve the originals. They no longer apply the cubes directly to the wall, but set them up in portable compartments, transferring the whole design to the walls by mechanical means.

During recent years the art has experienced a revival of a more independent character, especially in the United States. The improvements in the manufacture of glass, especially of the iridescent varieties, and the possibility of cutting glass into the exact forms of the design, have changed the character of the art, making it possible to follow exactly the design and the colors of nature. The Tiffany studios in New York have been chiefly instrumental in making these improvements. Among the best examples of American mosaic are the chancel of the crypt of the cathedral of St. John the Divine in New York, designed by Louis Tiffany; several designs in the Wade Memorial Chapel and the Huntingdon Mortuary Chapel, both in Cleveland, Ohio, and elsewhere, by Frederick Wilson; and the colossal mosaic curtain, 2500 square feet, of the National Theatre, Mexico—all products of the Tiffany studios.

It is interesting to note that the ancient Americans, especially the Incas and Mexicans, practiced mosaic. The Aztecs, who learned from their predecessors, the Toltecs, thus adorned their ceremonial masques of the gods, knife handles, and objects of adornment, substituting turquoises and shell for cubes of glass, which they did not possess. The best collection of ancient American mosaics is in the British Museum.

Bibliography. The subject of mosaics is well treated in Woltmann and Woermann, *History of Painting* (Eng. trans., New York, 1880);

a good general monograph is Edouard Gerspach, *La mosaïque* (Paris, 1885). The technique is carefully described by Eugène Müntz in *La mosaïque chrétienne* (Paris, 1893). All the mosaics of the Roman churches are reproduced in large colored plates and described by G. B. De Rossi, *Musaici cristiani di Roma* (Rome, 1876–96). The same has been done for those of St. Mark's in Venice by Organia in *La basilica di S. Marco* (Venice, 1881–88); for Monreale by Gravina, *Il duomo di Monreale* (Palermo, 1859). All the figured mosaics earlier than 900 A.D. are outlined and described in Raffaele Garrucci, *Storia dell' arte cristiana* (Prato, 1873–81). Consult also: Otto Pohl, *Die altchristliche Fresko- und Mosaikmalerei* (Leipzig, 1888), and Julius Kurth, *Die Mosaiken der christlichen Aera* (ib., 1902 et seq.); W. J. Furnival, *Leadless Decorative Tiles, Faïence, and Mosaic* (Philadelphia, 1904); Barwell and Druitt, *Mosaics and Stained Glass* (New York, 1909). See CHRISTIAN ART.

MOSAIC DISEASE. See TOBACCO.

MOSAIC GOLD. See GOLD.

MOSAIC WOOL. See RUGS.

MO'SASAU'RIA (Neo-Lat., from Lat. *Mosa*, the river Meuse + Gk. *σαῦρος*, *sauros*, lizard). An order of extinct marine reptiles—the Pythonomorpha of Cope. The reptiles possessed the slenderness of a snake combined with strong paddles, such as those of the whale, together with many lizard-like characters. The first specimen of a nearly perfect head skeleton was discovered in 1780 in the upper chalk of St. Pietersberg in Holland, on the Meuse River. A few other specimens have been found in the Cretaceous of England and Europe. In North America this reptile seems to have attained its most flourishing existence, for over 50 species, included in several genera, have been found. The Cretaceous of New Jersey has yielded 15 species. The Yale College collection contains a great number of specimens. *Mosasaurus princeps* from New Jersey is estimated to have been 40 feet long, and *Tylosaurus dyspelor* from Kansas was about 30 feet in length. Consult: A. C. Marsh, "Cretaceous Vertebrates of the West," in *United States Geological Survey Reports* (Washington, 1875); F. A. Lucas, "Animals of the Past," in *American Museum of Natural History, Handbook Series, No. 4* (New York, 1913); S. W. Williston, *Water Reptiles of the Past and Present* (Chicago, 1914).

MOSBY, mōz'bĭ, JOHN SINGLETON (1833–1916). An American soldier in the Confederate service, born at Edgemont, Powhatan Co., Va. He was educated at the University of Virginia, studied law, and was practicing his profession at Bristol, Washington County, Va., at the outbreak of the Civil War. After serving under Joseph E. Johnston in the Shenandoah valley in the winter of 1861–62, he was appointed by Gen. J. E. B. Stuart an independent scout, and guided that officer's cavalry in a bold raid in the rear of McClellan's army on the Chickahominy in June, 1862. Returning to Richmond after a short captivity early in 1863, Mosby recruited an independent body of cavalry for scouting and raiding purposes, and he then began his remarkable career as a leader of an irregular force of cavalry known as rangers, which frequently disbanded when hard pressed, only to reassemble at a signal and renew operations, practically guerrilla in character. The force was subsequently organized as a regular branch of the Confederate service as the Forty-third Battalion of Virginia Cavalry. His most brilliant exploit was the capture, in March, 1863, of Brigadier General Stoughton, U.S.A., at that officer's headquarters at Fairfax Courthouse, which he accomplished by a raid inside the Federal lines. Promoted to be major as a reward for this capture, he followed Lee's army into Pennsylvania in June, 1863, and worried the flanks of the Federal army as it moved southward after Gettysburg. In January, 1864, he was repulsed with considerable loss in a night attack on Harper's Ferry. In May he harassed the rear of Grant's army as it advanced on Fredericksburg, and later made a long raid in Maryland. In August he made one of the most important captures of his career, consisting of Sheridan's entire supply train, which he surprised near Berryville. In September he was wounded at Falls Church, but in the following month was again in the saddle, captured two Federal paymasters with $168,000 in greenbacks, tore up the Baltimore and Ohio Railway tracks, destroyed rolling stock, and made a prisoner of Brigadier General Duffié. In December, 1864, he was promoted to be colonel. After being disabled for a short time by a wound, he continued his operations until Lee's surrender, when he disbanded his troops and surrendered. On account of his methods there was much feeling against him, but through General Grant's intercession he was paroled. After the war he opened a law office at Warrenton, Va., and became a member of the Republican party, which he thought could best settle the question of reconstruction satisfactorily. From 1878 to 1885 he was United States Consul at Hongkong. On his return to America he established himself in law practice for a while in San Francisco. From 1904 to 1910 he was assistant attorney in the Department of Justice, Washington. He published an account of his exploits entitled *War Reminiscences and Stuart's Cavalry Campaign* (1887) and *Stuart's Cavalry in the Gettysburg Campaign* (1911). Consult: John Scott, *Partisan Life with Mosby* (New York, 1867); J. H. Alexander, *Mosby's Men* (New York, 1907); J. J. Williamson, *Mosby's Rangers* (ib., 1909).

MOSCHELES, mō'shĕ-lēs, FELIX (1833–). An English painter and author, son of Ignaz Moscheles. He was born in London and studied art in Paris and under Van Lerius in Antwerp. Afterward he exhibited in Antwerp, at the Paris Salon, and at the Academy and Grosvenor and New galleries in London. His works include genre scenes and portraits of Mazzini, Gounod, Browning, Rubinstein, Stanley, and Grover Cleveland. His publications include *Felix Mendelssohn's Letters to Ignaz and Charlotte Moscheles* (1888); *In Bohemia with Du Maurier* (1897); *Fragments of an Autobiography* (1902). Active in the cause of international arbitration and peace, he wrote and lectured concerning it; and he became president of the International Arbitration and Peace Association.

MOSCHELES, IGNAZ (1794–1870). An Austrian piano virtuoso and composer, born in Prague, of Jewish parentage. After a course of study at the Prague Conservatory he went to Vienna, where he became a pupil of Albrechtsberger and Salieri. He was a remarkable improvisator and won his greatest successes as much by that gift as by the more important discovery of the "singing tone" by which he secured modifications of tone and variations in tone color by means of touch—an art subse-

quently developed by Liszt and his school. Although he was very successful in his tours of Russia, Holland, Germany, and France, his greatest fame was won in London, in which city he took up his residence in 1821. He did not, however, sever his connection with the Continent, for in 1824 he was giving lessons in Berlin, where he numbered Mendelssohn among his pupils, and formed a friendship with him that was of great mutual profit. He was of much assistance to Mendelssohn when that master first visited England, and was in turn persuaded to join Mendelssohn in the management of the newly formed Leipzig Conservatory (1843). In 1846 he settled permanently in Leipzig, where he taught at the conservatory until his death. With the exception of a collection of studies which are still highly esteemed, his compositions are forgotten. His works include piano concertos, arrangements, instrumental chamber music, sonatas, and numerous études, about 140 opus numbers altogether. He died in Leipzig. Consult *Aus Moscheles' Leben: Nach Briefen und Tagebüchern herausgegeben* (Leipzig, 1872); English translation by A. D. Coleridge.

MOSCHEROSCH, mō'she-rōsh, JOHANN MICHAEL (1601–69). A German satirist of the seventeenth century. He came of an old Spanish family and was born at Willstett, near Strassburg, and wrote under the name Philander von Sittewald. He studied in Strassburg, and held various diplomatic positions. He was admitted to the Fruchtbringende Gesellschaft in 1645 with the name of "Dreamer," and about 1640 published his "Book of Visions," *Wunderliche und wahrhaftige Geschichte Philanders von Sittewalt*, a sharp satire of the times, apparently patterned after Quevedo's *Sueños*. Consult: Nickels, *Moscherosch als Pädagog* (Leipzig, 1883); Pariser, *Beiträge zu einer Biographie von Moscherosch* (Munich, 1891); Erich Schmidt, *Charakteristiken*, vol. i (2d ed., Berlin, 1902); Kürschner, *Deutsche Nationalliteratur*, vol. xxxii.

MOSCHI, mŏs'kī (Lat., from Gk. Μόσχοι, *Moschoi*). An ancient people of Asia Minor, living south of the Caucasus. According to Herodotus (iii, 94; vii, 78) they dwelt between the sources of the Phasis and the Cyrus, east of the Euxine. Under the appellation of the Mushkaia, or Mushki, they appear in the Assyrian inscriptions as carrying on war against Tiglath-pileser I (c.1140–1105 B.C.), who defeated their forces and overthrew their five kings, and as paying tribute to Asurnazirpal III (885–860 B.C.). Mita, King of Mushki (possibly Midas of Phrygia), was in alliance with the kings of Urartu (see CHALDIANS) and Tabal. Mushku is also mentioned in the inscriptions of Sargon II (722–705 B.C.). According to Sayce most of the Hittite hieroglyphic inscriptions come from the Hittite Empire established by the Moschi about 1200 B.C., of which Tyana was the capital. The name of the Moschi is often coupled with that of Tabal or the Tabareni. In the Bible they are spoken of as Meshech and Tubal. Consult Friedrich Delitzsch, *Wo lag das Paradies?* (Leipzig, 1881), and A. H. Sayce, in *Expository Times* (London, November, 1914).

MOSCHINÆ, mŏs-kī'nē. See CERVIDÆ.

MOSCHUS, mŏs'kŭs (Lat., from Gk Μόσχος, *Moschos*). A Greek bucolic poet of the middle of the second century B.C., a native of Syracuse in Sicily. He was a pupil at Alexandria of Aristarchus of Samothrace (q.v.), and himself wrote a prose work on Greek grammar. We possess his "Rape of Europa" (Εὐρώπη) and his epigram "Cupid the Runaway" (Ἔρως Δραπέτης). To him also was long ascribed the "Lament for Bion" (Ἐπιτάφιος Βίωνος), a poem in hexameter verse; this Bion was Bion of Smyrna (q.v.), whom some wrongly regarded as teacher of Moschus. But modern scholars have held that the poem was written rather in the time of Sulla. His poems were united in antiquity with those of Theocritus and Bion, and appear with them in modern editions also (cf., e.g., that of Wilamowitz-Moellendorff, Oxford, 1905). His extant poems were translated by Lang (London, 1896) and by J. M. Edmonds, *The Greek Bucolic Poets* (London, 1912). Consult Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

MOSCOSO DE ALVARADO, mŏs-kō'sō dā äl'vä-rä'dō, LUÍS DE (1505–c.61). A Spanish soldier and explorer in America. He was born in Badajoz, and was a kinsman of Pedro de Alvarado, whom he followed to Peru (1534). Four years afterward, with De Soto, he started for Florida, and succeeded him in command in 1542. After terrible privations and with decimated forces he reached Mexico in 1543. There Mendoza received him kindly. In 1551 Moscoso accompanied Mendoza to Peru, where he died.

MOSCOW, mŏs'kō (Russ. *Moskva*). A government of central Russia, bounded by the Government of Tver on the northwest, Vladimir on the northeast, Riazan on the east, Tula and Kaluga on the south, and Smolensk on the west (Map: Russia, E 3). Area, 12,859 square miles. It occupies a portion of the central plateau of Russia, and slopes eastward towards the Oka. It belongs to the basin of the Volga and is watered by that river and the Oka on the boundaries, and by the Kliama, Moskva, and other rivers in the interior. Geologically the government belongs to the Moscow coal basin, the carboniferous formation being covered up with various clays, sandstone, and marble. The soil is loamy and not very fertile. About 40 per cent of the area is clothed in forests, mostly belonging to private persons.

Agriculture is highly developed and the farm products are of great diversity. Rye, potatoes, and oats are the staples. Gardening is carried on extensively, and vegetables are raised in quantities sufficient to be exported to St. Petersburg and Kronstadt. Stock raising is also important.

Moscow is the leading manufacturing government of Russia. In 1913 its manufacturing establishments exceeded 2400, employing over 200,000 hands. The value of the output of that year was approximately $200,000,000. The chief products are textiles (especially cotton and silk); of cotton factories alone there were in that year some 350, with more than 100,000 workers, and an output valued at about $55,000,000. Other important products are machinery, brick, chemicals, knit goods, etc. The house industry is still very important and has reached here a higher degree of development than in any other part of Russia. It exists throughout the government, groups of villages being engaged in the manufacturing of one product. The articles manufactured in this way are of a very wide range, including leather and leather products, hats, pins, brushes, cheap

chromos, carriages and wagons, lace, gloves, etc. It is estimated that agriculture furnishes on the average only about 40 per cent of the income of a peasant family in the government.

The commerce in the products of the house industry is of great extent and is centred chiefly in the city of Moscow. The government is well supplied with transportation facilities, being traversed by six of the most important railway lines of the Empire. Education is poorly provided for. The proportion of illiterate is estimated at 80 per cent. Pop., 1912, 3,303,400, chiefly Great Russians (99.6 per cent in rural districts). Capital, Moscow.

MOSCOW. The second capital and historically the most famous city of the Russian Empire, capital of the military district and government of the same name, and the second largest city of Russia. It is situated on the river Moskva (a tributary of the Oka) in lat. 55° 45′ N. and long. 37° 37′ E., 400 miles southeast of St. Petersburg, at an altitude of from 500 to 850 feet above the level of the sea (Map: Russia, E 3). It has a rather cold climate, the annual temperature being 40.1° F., ranging from a mean of 14° in January to 66.5° in July. The summers are quite warm (in July temperature reaches 100° F.), and the winters dry and cold, snow remaining on the ground most of the season.

The city is irregularly built. On the north bank of the river rises the Kremlin, the acropolis of old Moscow, for many centuries the centre of the political and religious life of Russia and still the most venerated place in the heart of every Russian. It was the nucleus of the modern city and contained in the early periods of the history of Moscow the palace of the Czar, the chief churches and monasteries, and the palaces of the nobility. As the city developed, the merchants and the numerous artisans began to settle outside of the walls. Thus grew up the commercial quarter east of the Kremlin, known as the Kitai Gorod (Chinatown), still constituting the commercial centre of Moscow, and numerous small communities independent in their internal administration and composed mostly of members of the same trade. These divisions are still retained to a large extent in the parishes into which the city is divided. They were subsequently grouped together and surrounded by walls, and now form the Byely Gorod (white town), surrounding the Kremlin and the Kitai Gorod, and the Zemlianoy Gorod (earthen town), inclosing all the above-mentioned quarters as well as Zamoskvoretchye, on the southern bank of the river. There is also a fourth inclosure, Kramer-Kollezh (earthen wall), surrounding the outer parts of the city and forming the limits of Moscow proper. Only the walls of the Kremlin and of the Kitai Gorod have been preserved, all others having been converted into boulevards and avenues. See KREMLIN for illustration.

Although one of the oldest cities of Russia, Moscow has preserved comparatively few architectural monuments outside of its churches and monasteries, most of the old buildings having perished in the destructive conflagrations which figure so prominently in the history of the city. With the introduction of Western civilization into Russia by Peter the Great and his successors, the Russian style of architecture gradually disappeared in practically all the secular and private buildings, and the application of Western standards not infrequently produced very peculiar effects. Under Alexander II a revival of Russian architecture was inaugurated and a number of successful restorations have since been made. The chief interest of Moscow, as already stated, is centred in the Kremlin, both for its historical associations and for its churches and monasteries, with their semibarbaric splendor and curious architecture. The Kremlin is nearly triangular in shape and surrounded by a wall about a mile and a half long. The wall is surmounted by 18 towers and pierced by five gates, among which is the Spasskiya Vorota (Gate of the Redeemer), one of the most revered historical places of Russia, and associated with many of the chief events of national history. Within the walls of the Kremlin the most famous edifice is the Uspensky Sobor (Cathedral of the Assumption), in which all the Russian monarchs since Ivan IV have been crowned. The present building was erected by Aristotele Fioraventi in the fifteenth century on the site of an older church founded in 1326. It is Lombardo-Byzantine in style, with Indian cupolas. The semidark interior is adorned with numerous icons, covered with gems and precious metals. They are of great antiquity, one of them being attributed to St. Luke. The treasury of the cathedral, one of the richest in Russia, contains many valuable Bibles, manuscripts, and sacred vessels, as well as numerous relics of saints. The cathedral of St. Michael the Archangel is the former burial place of the Russian monarchs. It dates, in its present form, from the beginning of the sixteenth century and is surmounted by five domes, the central one being of gilt. The interior is richly decorated and its walls are covered with the portraits of the Russian monarchs interred there. In the partly Gothic Cathedral of the Ascension, founded in 1397, the walls and the thick pillars are covered with portraits of saints and Greek philosophers, and the floor is made of semiprecious stones of various colors.

One of the sights of the Kremlin is the tower of Ivan the Great, 322 feet high and crowned by a gilt dome; it contains 34 bells, weighing altogether about 580,000 pounds. In former times the Kremlin contained numerous monasteries and convents, of which only a few have been retained. The most interesting of these are the Maiden Convent, for centuries the burial place of the Russian princesses, and the Tchudov Monastery, an institution of great historical importance as well as a great factor in the development of ecclesiastical learning in Russia. Near the tower of Ivan the Great stand two objects very famous in Russia. One is the Czar Bell, cast in 1735 and now resting on a stone pedestal. Part of the bell, broken off during the fire of 1737, lies near by. It is over 60 feet in circumference around the rim, 19 feet high, and weighs about 200 tons. The other, near the Museum of Arms, is the Czar Cannon, cast in 1586, and weighing nearly 40 tons. The palaces of the Kremlin are mostly modern, and only a few portions of the old abode of the Russian monarchs have survived. The great palace, completed in 1849, is a vast building of white stone with a gilt cupola, and possessing numerous magnificent halls devoted to the different orders of Russia. Attached to it are the living rooms of the old Russian rulers, known as the Terem and dating from the seventeenth century. They are of great architectural value

and well preserved. Connected with the palace are the old banquet hall known as Granovitaya Palata, with its red stoop, from which Russian monarchs used to address the populace; and the Oruzhaynaya Palata (hall of arms), containing immense treasures, such as crowns, sceptres, thrones, costumes, banners, armor, gold and silver plate, carriages. The palace of the patriarch, built by Nikon in 1655, has one of the most valuable libraries in Russia and a treasury of fabulous wealth. The arsenal of the Kremlin is one of the largest in the world.

The Kitai Gorod, adjoining the Kremlin, also has many historical associations. Especially noteworthy is the Red Square, used repeatedly as a camp by the besieging Mongols, as a forum by the Russian monarchs, and as a place of execution. Facing the Red Square is the cathedral of Vasili the Beatified, which for mixture of styles, colors, and architectural lines has few equals in the civilized world. It was built by an Italian architect at the command of Ivan the Terrible in 1554 to commemorate the conquest of Kazan, and consists of a number of separate buildings under separate cupolas, differing from each other in form, dimension, and glaring colorings. The interior does not differ essentially from those of the other great churches of Moscow, being dark, close, and covered with paintings, gold, and gems in great profusion. Contrasting favorably with the cathedral of Vasili the Beatified is the modern church of the Saviour, consecrated in 1881 in commemoration of the destruction of Napoleon's Grand Army in 1812. It is Lombardo-Byzantine in style, cruciform, and well proportioned, built of white marble and surmounted with five cupolas. The paintings and the marble reliefs of the interior have been executed by the best artists of Russia.

In the centre of the Red Square stands the monument to Minin and Pozharsky, who liberated Moscow from the Poles in 1612. The Greek Monastery of St. Nicholas in the Kitai Gorod deserves special mention for its influence on education in Russia. It was under the auspices of the monks of St. Nicholas that the first Russian academy for classical education was established in the seventeenth century. It numbered among its pupils Lomonosov and others prominent in the literary and the political life of the country. The Kitai Gorod possesses a number of old residences of the boyars (see BOYAR), of which the most interesting is the family house of the Romanovs, faithfully restored in 1859. The Gostiny Dvor, the centre of the retail trade of Moscow, is architecturally also very interesting. Other noteworthy secular buildings and monuments are the Petrovsky Palace, occupied by Napoleon during his stay at Moscow, the town hall (duma), the Sukharev Tower (1692–95) with the reservoir, the triumphal arch, etc. Moscow has extensive markets, of which probably the most interesting is the Tolkuchy, where second-hand clothes are sold. In the most northern quarter of the Zemlianoy Gorod are still found many stately, though somewhat decayed, mansions of the old nobility, while Zamoskvoretchye, on the opposite side of the river, is the stronghold of the wealthy merchant class.

Economically, Moscow is exceedingly important, both with regard to industries and commerce. The manufacturing industries date from the time when the city was the residence of the court and attracted skilled artisans from all over Russia as well as from foreign countries. At present Moscow is the second-largest manufacturing city of the Empire and the centre of the textile industries, furnishing a considerable portion of the cotton goods for the Asiatic trade. The textile industry ranks first, with over 200 factories, 50,000 workers, and an output exceeding $100,000,000. Next to textiles are foodstuffs, metal products, paper, leather and wood products, and machinery. As early as the fourteenth century Moscow was an important commercial centre. Its trade grew up with the political power of the Principality of Moscow, and received a great stimulus from the settlement of the Novgorod merchants. The advantageous position of the city at the convergence of six railway lines, which connect it with every part of European Russia as well as with Siberia, has played an important part in its commercial development. Manufactures, agricultural products from the southern and the central provinces of Russia, minerals from the coast, and tea from Asia, all find their way to Moscow and go partly to supply the local demand and partly to supply the trade with the interior or with foreign countries. The rise of St. Petersburg had at first a detrimental effect on the foreign trade of Moscow, but the development of the Asiatic trade, of which Moscow is the natural centre, has more than compensated for the loss in any other direction. The trade by water is important. About 338,000 tons of goods are imported annually, other chief imports being tea, iron and steel products, raw silk, indigo, cotton yarn, etc.

Moscow is administered by a governor general, who is also at the head of the military district of Moscow. The municipal council of 160 members is elected by owners of real estate and merchants of the first class, and has an executive committee of six members. Both the municipal council and the executive committee are presided over by the mayor (*golová*), who, unlike the mayors of all other Russian towns save St. Petersburg, is appointed by the government from two candidates suggested by the council.

The budget of the city for 1914 exceeded $21,000,000, more than half of which was derived from municipal undertakings, whose number is rapidly increasing in Moscow. The chief items of revenue are real estate and internal taxes, which yield about one-quarter of the revenue, subvention from the Imperial government, the zemstvo, and returns from municipal property and enterprises. About one-third of the revenue is spent on sanitation, while the amount expended on education has greatly increased since 1913, due to the passage of a universal education bill. In 1913 this approximated $2,500,000. The municipality owns the water works, slaughterhouses (with cold-storage facilities), baths, and a number of lodging houses, while municipal bakeries and market places are under consideration. In regard to facilities for local transportation Moscow is far behind most European cities of equal size and importance, but is making rapid progress in this direction as in many others. Moscow has many prominent educational establishments. Besides the university (see MOSCOW, UNIVERSITY OF) there are a theological seminary, a technical school, an agricultural institute, an institute for the study of Oriental languages, schools of art, painting, and architecture, a school of engineering, two

1. CATHEDRAL OF VASILI THE BEATIFIED
2. CHURCH OF THE SAVIOUR

seminaries for teachers, a number of dramatic schools, a commercial institute, 21 Gymnasia, five Realschulen, a school of Church music, and numerous other special schools. Libraries are numerous. The most important museums and collections are the Rumiantzev Museum, consisting of a fine library and collections of paintings, sculptures, ethnography, etc.; the historical museum, and the Tretiakov Gallery of modern paintings, now belonging to the city. A number of prominent scientific organizations have their home at Moscow, including the society of naturalists and the society of Russian history and antiquities. The numerous archives of Moscow are also noteworthy. The benevolent institutions, especially the foundling asylum, are among the largest in Russia. The theatres of Moscow, especially the "small theatre," have played a prominent part in the development of Russian drama. The periodical publications of Moscow are numerous, and the book trade of the city, especially that handling popular publications, is very extensive.

The population of Moscow has increased from 602,000 in 1871 to 1,635,000 in 1913; and 1,817,100 in 1915. The predominance of males is very marked. About 50 per cent of the population belong to the peasantry. The Greek Orthodox inhabitants constitute about 94 per cent of the total population of Moscow, as compared with 84 per cent in St. Petersburg. There are 2 per cent of Lutherans and 1 per cent Roman Catholics. The environs of the city are replete with historical interest and contain many estates of the old nobility and royal favorites, among which may be mentioned the Petrovsko-Razumovskoye, with its extensive park and academy of agriculture. There are also many large, picturesque parks and groves, where the masses amuse themselves on holidays. Of these the Petrovsky Park, northwest of the city, is one of the most frequented. No city is so typically Russian, so expressive of the character and peculiarities of its inhabitants, and so dear to the heart of every Russian, as this old city, affectionately known as "Little Mother Moscow."

History. The site of the city was probably inhabited long before the twelfth century, but the first mention of Moscow dates from 1147, when it was the estate of the Suzdal Prince Yuri Dolgoruki. The city began to rise with the Principality of Moscow under Daniel, the son of Alexander Nevski, in the thirteenth century, and especially under Ivan Kalita (1328–40), who with the aid of the Mongols succeeded in annexing many of the minor principalities to Moscow, and greatly embellished the capital. In 1325 the Metropolitan Peter transferred his seat to Moscow from Vladimir-on-the-Kliasma, thereby laying the foundation of its future position as the religious capital of Russia. In 1363 the city was besieged by Olgierd, the Grand Duke of Lithuania, and in 1382 it was burned by the Khan Tokhtamish. With the union of the Russian principalities under Ivan III (1462–1505) Moscow became the capital of Russia and began to assume the proportions and appearance of a large city. In 1520, during the reign of Vassili Ivanovitch (1505–33), the city is said to have had 45,000 dwelling houses. But the growth of the city was often interrupted by the invasions of the Tatars, conflagrations, and pests. It also suffered from internal dissensions and revolts during the seventeenth century, notably the Polish occupation in 1610–12, the revolt of the people against the corrupt favorites of the Czar, the riots following the introduction of religious reforms by Nikon, and the rise of the Streltsi (q.v.) against the reforms of Peter the Great. Peter found Moscow unfavorable for the introduction of his reforms, and transferred the court to St. Petersburg. The University of Moscow was founded in 1755. On Sept. 14, 1812, Moscow, almost entirely deserted and with its treasures and archives removed to Vladimir, was occupied by the army of Napoleon, seven days after his disastrous victory at Borodino (q.v.). On the following day the Emperor made his entry into the city. On the night of the 15th to the 16th, in accordance with a prearranged plan, fires were started in several parts of the city, and soon the entire place was in flames, so that on September 16 Napoleon was compelled to remove his headquarters from the Kremlin. On October 19 the French began their fatal retreat from the city. On May 18, 1896, Moscow was the scene of a fearful disaster, brought about by the distribution of gifts at a popular festival arranged in honor of the coronation of Nicholas II. Over 2000 people were crushed to death and many more wounded. The city was a centre of revolutionary disturbances in 1905–06. On Feb. 17, 1905, Grand Duke Sergius was assassinated in the Kremlin. Zemstvo congresses assembled in September and November. On December 21 the revolutionaries rose in armed revolt, and there was fighting for a week before the insurrection was suppressed. Five thousand are supposed to have perished.

Bibliography. M. P. Fabricius, *Le Kremlin de Moscou* (Moscow, 1883); Eugen Zabel, *Moskau* (Leipzig, 1902); Ivan Zabyelin, *History of Moscow* (Moscow, 1902); H. M. Grove, *Moscow* (New York, 1912); Wirt Gerrare, *Story of Moscow*, in "Mediæval Towns Series" (ib., 1912); J. J. Hartmann, *Moskau* (Zürich, 1913).

MOSCOW. A city and the county seat of Latah Co., Idaho, 94 miles south-southeast of Spokane, Wash., on the Northern Pacific and the Oregon-Washington Railroad and Navigation Company lines (Map: Idaho, A 3). It is the seat of the agricultural and mining schools of the University of Idaho (q.v.), and has a Carnegie library and fine high-school and Federal buildings. Mining, farming, fruit growing, stock raising, and lumbering are the leading industries, and there are some manufactures. The water works are owned by the city. Pop., 1900, 2484; 1910, 3670.

MOSCOW, UNIVERSITY OF. The oldest and largest institution of higher learning in Russia, organized in 1755. At its inception it consisted of three faculties—law, medicine, and philosophy—with a total staff of 10 professors, mostly brought from western Europe. The curriculum was very limited in its scope until 1807, when it was reorganized by Alexander I. At the burning of Moscow in 1812 the university buildings were destroyed. The most valuable collections, however, had been previously removed. Instruction, suspended for a while, was resumed in 1813, and new buildings were erected in 1816–19. In 1835 the number of chairs was increased to 35 and a uniform four years' course established for all departments. In 1841 the Medicosurgical Academy was united with the University. The liberal University Act of 1863

gave the professors and students a certain amount of self-government, which was abolished during the reactionary régime of Alexander III in 1884. In 1902 Moscow University consisted of the following faculties: (1) medicine, (2) law, (3) physical and natural sciences, (4) historico-philological faculties. It offers four-year courses leading to the degree of candidate. In the medical school, however, the course covers five years, the regular degree being physician. The degrees of master, doctor of the various sciences, and M.D. are conferred for special investigation. The university library contains nearly 400,000 volumes and 29,000 pamphlets. The departmental libraries, laboratories, observatories, museums, etc., number altogether 33. The medical department has 25 special institutes, clinics, and hospitals. The number of students in 1913 was 9760. The expenditures of the university amounted to 2,595,075 rubles. As the majority of the students come from the poorer classes, the number of scholarships is very large, and they provide for about one-tenth of the students. The university is under direct supervision of the Minister of Public Instruction, who appoints the rector. There is a university council, but its powers are limited.

MOSEILIMA, mō-sī'lē-mȧ (Ar. *Musailimah*, from the proper name *Muslimah*, from *salima*, to be safe). One of the most important of the rival prophets who came forward in Arabia when Mohammed had stirred the religious thought of the people. He belonged to the tribe of the Beni Henifah, of Yamama in Nejd. The traditions about his life and age are extremely contradictory and legendary. It appears, however, tolerably certain that he had risen to a certain eminence in his tribe, probably at first only as a religious teacher, before Mohammed assumed his prophetical office. He seems to have proposed to divide the religious leadership with Mohammed, a suggestion which the latter contemptuously refused. He never undertook to supplant Mohammed. After the death of the Prophet, Moseilima set up the standard of open opposition and was defeated and killed in a desperate battle by Khalid, who had been sent against him by Abu Bekr. His "heresy" was stamped out, and only a few scattered supporters escaped to El Hasa and Basra, where they may have laid the foundation of the later Karmathian creed. See MOHAMMEDAN SECTS.

MOSELEY, mōz'lĭ, EDWARD AUGUSTUS (1846–1911). An American economist and authority on railroads, born at Newburyport, Mass. After 1862 he made several voyages on vessels engaged in East Indian trade. Later he studied law, was admitted to practice before the Supreme Court of the United States, and served in the Massachusetts Legislature. When the Interstate Commerce Law was passed in 1887, Moseley became secretary of the Interstate Commerce Commission, which he helped to organize. During the American occupation of Cuba he assisted in drafting railroad laws for that island. In 1902 he was one of the assistant recorders of the Anthracite Coal Strike Commission. His publications include: *Arbitration as Applied to Railway Corporations and their Employees* (1893); *Federal Supremacy* (1907); and various pamphlets.

MOSELEY, HENRY (1801–72). An English mathematician, born at Newcastle-under-Lyme. He graduated at St. John's College, Cambridge, studied theology and was ordained a priest of the Church of England in 1828, and in 1831–44 was professor of natural and experimental philosophy and astronomy at King's College, London. In the latter year he was made an inspector of normal schools. In 1853 he was appointed canon of Bristol Cathedral and two years afterward became chaplain to the Queen. Moseley, in a paper published in the *Philosophical Transactions of the Royal Society* in 1850, announced the formulæ for the dynamical stability of warships, which have come into common use. His works include: *A Treatise on Mechanics, Applied to the Arts* (1834); *Astro-Theology* (1838; 3d ed., 1860); *Lectures on Astronomy* (1839; 4th ed., 1854); *The Mechanical Principles of Engineering and Architecture* (1843; 2d ed., 1855), his most important book, edited by Prof. Dennis Hart Mahan (q.v.), for the use of students at West Point, and translated into German by Professor Schefler, of Brunswick; *Theoretical and Practical Papers on Bridges* (1843).

MOSEL'LA. The name of a Latin poem, by Ausonius (q.v.).

MOSELLE, mō-zĕl', Ger. MOSEL, mō'zel. One of the principal affluents of the Rhine. It rises on the west slope of the Vosges Mountains in the northeast corner of France, flows northwestward to the French boundary, then northward past Metz and Thionville, after which it turns to the northeast, and with many windings through the Prussian Rhine Province, being for a time the boundary between the Grand Duchy of Luxemburg and Germany, enters the Rhine at Coblenz (Map: Germany, B 3). Throughout the greater part of its length the Moselle runs through a narrow valley occupied by fertile fields and meadows and inclosed by steep hills and mountains, in many places becoming rocky cliffs. In the lower valley the hills are vine-clad, producing the celebrated Moselle wines, noted for their delicate aromatic flavor. Numerous ruins and historic landmarks also make the valley notable. The total length of the river is 314 miles; it is navigable downward from Frouard for small vessels. From Metz to the frontier it is canalized. Two lines of steamers ply regularly between Coblenz and Treves. The stream was followed in the fall of 1914 by the Army of the Moselle in the attempt of the Germans to reach Paris. See WAR IN EUROPE. Consult W. M. Davis, *Geographical Essays: The Seine, the Meuse, and the Moselle* (Boston, 1909), and Charles Tower, *Along Germany's River of Romance: The Moselle* (New York, 1913).

MOSEN, mō'zen, JULIUS (1803–67). A German author, born at Marieney in the Vogtland, Saxony. He attended the University of Jena, where Goethe awarded him the first prize for his competitive anniversary poem on Karl August's fiftieth birthday; completed his studies at Leipzig in 1826–28; and from 1828 to 1831 was in the office of an advocate at Markneukirchen. In 1834 he settled in Dresden as a lawyer and became prominent in literature. He went to Oldenburg in 1844 under appointment from Grand Duke Paul Frederick August as dramaturgist of the Hoftheater with title of councilor. His activity in that post was interrupted by illness, and from 1850 he was pensioned. His first public success was achieved by the epic *Lied vom Ritter Wahn* (1831), based on the Italian legend of *Il cavaliere Senso*, and his reputation was much increased by *Ahasver*

(1838), a second poem in that kind, whose large, historical action is somewhat impeded by its philosophy. The *Gedichte* of 1836 (2d ed., 1843) include the well-known ballads, long since established as Volkslieder, "Andreas Hofer," "Der Trompeter an der Katzbach," and "Die letzten Zehn vom vierten Regiment," descriptive of an episode in the Polish contest for independence. Of his works of fiction the best, perhaps, are the *Bilder im Moose* (2 vols., 1846), short stories, finished in workmanship. His dramas were overweighted with the rhetorical exposition of his ideas on politics and history. *Otto III.* (appeared with three others as *Theater*, 1842) was the most important. As dramaturgist, he did much to further German drama, especially Shakespearean presentations. An excellent collective edition of his works is that issued by his son in 1880 (6 vols., Leipzig). Consult the anonymous biography, *Julius Mosen* (Oldenburg, 1878); *Allgemeine deutsche Biographie*, vol. xxii (Leipzig, 1885); Julius Mosen, *Erinnerungen* (Plauen, 1893).

MOSENTHAL, mō'zen-täl, Joseph (1834–96). A German-American musician, born at Cassel. He studied under his father and Spohr and in 1853 came to America, where he played the organ in Calvary Church, New York City, from 1860 to 1887. He was conductor of the Mendelssohn Glee Club in New York City from 1867 to 1896, played a first violin in the Philharmonic Orchestra for 40 years, a second violin in the Mason and Thomas Quartet for 12, and composed much Church music, such as the psalm "The Earth is the Lord's," and part songs for male voices, *Thanatopsis*, *Blest Pair of Sirens*, and *Music of the Sea*.

MOSENTHAL, Salomon Hermann von (1821–77). A German dramatist. He was born at Cassel, studied at Marburg, and in 1850 became an official in the Ministry of Public Instruction at Vienna and was soon afterward appointed ministerial archivist. His investiture with the Order of the Iron Crown in 1871 conferred knighthood upon him. He is chiefly known by the dramas *Deborah* (1850; numerous later editions known in English as *Leah the Forsaken*) and *Der Sonnenwendhof* (1856), which have been represented with success and translated into several languages. His plays show mastery of stage technique and effective situations, but are somewhat hollow and rhetorical. He also wrote the libretti for a number of well-known operas, notably Nicolai's *Die lustigen Weiber von Windsor* (1849) and Goldmark's *Die Königen von Saba* (1875). His collected works were published in six volumes in 1877–78. Consult: *Allgemeine deutsche Biographie*, vol. xxii (Leipzig, 1885); Keller, *Nachgelassene Schriften* (Berlin, 1893); Hebbel, *Litteraturbriefe* (ib., 1901).

MÖSER, mē'zēr, Albert (1835–1900). A German lyric poet. He was born at Göttingen and, after studying there, became a teacher of the classical languages in Dresden. His odes, sonnets, and songs attained great popularity, especially a ballad, *Die Rose von Mars la Tour*, and are marked by much melody, by a dreamy reflective manner, and occasionally by great skill in the reproduction of classical metres. His *Gedichte* were published in 1865. Consult article by M. Schneidewin, in the *Preussische Jahrbücher*, vol. cxxi (Berlin, 1905).

MOSER, mō'zēr, Gustav von (1825–1903). A popular German dramatist, born at Spandau, May 11, 1825. Trained for the army, he entered it in 1843, and served till 1856, when he married the daughter of a wealthy landed proprietor. After an unfortunate venture in comedy, *Der weibliche Hussar*, he devoted himself to agriculture till a happy meeting with the Berlin stage director Wallner brought him back to the stage in 1861 for a career of almost unbroken popular success. Of about 100 comedies and farces, written some alone and some in coöperation with L'Arronge, Heiden, Schönthan, and others, the most noteworthy are: *Das Stiftungsfest* (1873); *Ultimo* (1873); *Der Veilchenfresser* (1876); *Der Bibliothekar* (1878); *Krieg im Frieden* (1880). He also wrote a number of plays in collaboration with others. A uniform edition of Moser's works in 22 volumes was published in 1872–94. Consult Hans von Moser, *Gustav von Moser: Vom Lieutenant zum Lustspieldichter* (Wismar, 1908).

MOSER, Johann Jakob (1701–85). A German publicist, born in Stuttgart. He studied at the University of Tübingen, where in 1720 he became extraordinary professor of law. In consequence of some difficulties with the censor he resigned this position in 1732 and in 1736 answered a call to the University of Frankfort-on-the-Oder. Here he incurred the displeasure of Frederick William I and in 1739 was again compelled to resign. In 1747 he became Privy Councilor and chief of the chancery in the service of the Landgrave of Hesse-Homburg, but two years later he went to Hanau and in 1751 returned to his native city, where he entered the service of the Duke of Württemberg. In 1759, being held responsible for certain manifestoes directed against the Duke, he was imprisoned in the fortress of Hohentwiel, where he remained for five years. After his release his offices were restored to him. Among his works are: *Deutsches Staatsrecht* (53 vols., 1737–54); *Neues deutsches Staatsrecht* (21 vols., 1766–75; 2 more vols. and index, 1781–82); *Deutsches Staatsarchiv* (13 vols., 1751–57); *Lebensgeschichte* (3d ed., 4 vols., 1777–83). Consult Wächter, *J. J. Moser* (Stuttgart, 1885).

MÖSER, mē'zēr, Justus (1720–94). A German historian and publicist, born at Osnabrück. He studied law at Jena and Göttingen and in 1747 was chosen *advocatus patriæ*. He was sent to England in 1763 on financial business of the allies. During the minority of the Duke Frederick of York, who afterward became Bishop of Osnabrück, Möser was the principal adviser of the Regent. He founded in 1766 the weekly *Die Osnabrückischen Intelligenzblätter*, from which he reprinted *Patriotische Phantasien* (in 4 vols., 1774–76), a series of brilliant and valuable essays. His *Osnabrückische Geschichte* (1768; 3d ed., 1819) is an anticipation of the best results of the modern German historical methods. His collected works, edited by Abeken (Berlin, 1842–44), include a biography by Nicolai and Möser's poetry. Consult: Kreyssig, *Justus Möser* (Berlin, 1857); *Allgemeine deutsche Biographie*, vol. xxii (Leipzig, 1885); Rupprecht, *J. Mösers soziale und volkswirtschaftliche Anschauungen* (Stuttgart, 1892); K. Mollenbauer, *Mösers Anteil an der Wiederbelebung des deutschen Geistes* (Brunswick, 1896).

MOSES (Heb. *Mosheh*, Aram. *Musheh*, Ar. *Musa*, Gk. Μωυσῆς, *Mōysēs*, or Μωσῆς, *Mōsēs*). The deliverer of Israel from Egyptian bondage, recipient of the Law, and author of the Pen-

tateuch, according to Hebrew tradition. If the name is Hebrew, it comes from the root *mashah* and means 'deliverer,' 'one who draws out'; cf. *yamsheni*, 'let him deliver me' (Ps. xviii. 17). Pharaoh's daughter, who is supposed to speak Hebrew, calls the child *Mosheh*, 'because I have drawn him out of the water' (Ex. ii. 10), though it might seem that *mashuy*, 'drawn out,' 'delivered,' would have been more appropriate. It is possible that the rendering of the Greek version, *Moyses*, followed by Philo, New Testament writers, and Josephus, represents an attempt to find an Egyptian etymology, and Josephus suggests a derivation from *mou*, 'water,' and *ses*, 'taken'; but the order and the construction in Egyptian would be different. More recently it has been conjectured that *Mosheh* corresponds to an Egyptian *'mes'* or *'möse,'* meaning 'child,' 'offspring'; but the sibilant is different, as is also the length of the first vowel. There seems to be no adequate reason for abandoning the Hebrew etymology.

The leading events in the life of Moses, as set forth in Exodus-Deuteronomy, are the following. He was born in Goshen (q.v.) at a time when an Egyptian king whose name is not mentioned was oppressing the Hebrews, forcing them to hard labor in the building of the cities Pithom (q.v.) and Ramses, ordering their two midwives, Shiphrah and Puah, to slay all male infants, and, when they disobeyed, commanding the Egyptians to kill the children. His father was Amram, a grandson of Levi, who had come with Jacob into Goshen 430 years before the Exodus, and his mother was Amram's aunt (*dodah*), Levi's daughter, Jochebed (Yah is glory). The date of his birth is not given, but, according to the chronological system adopted in the Old Testament, it occurred 990 years before the destruction of the temple by Nebuchadnezzar, which took place in 586 B.C. (80 years to the Exodus, 480 from the Exodus to the building of the temple, 430 the duration of Solomon's temple); consequently in 1576 B.C. To save her child from the massacre, Jochebed put the infant in an ark of bulrushes, i.e., a papyrus box, and set it out in the river. Rescued by the daughter of Pharaoh, Moses was brought up as her own child. When he was grown up, he murdered an Egyptian who had killed one of the Hebrews and fled to Midian, where he married Zipporah, the daughter of a priest Jethro (or Reuel), whose flocks he tended until he was 80 years of age. Then the god of his fathers appeared to him in a bush that was burning without being consumed, commanded him to go to Egypt to deliver his people, attested his mission by giving miraculous power to his rod and his arm, and hinted at His divine name without making it fully known. Later He revealed to Moses His real name, Yahwe (see JEHOVAH), by which He had not been known to his fathers and evidently not to his father-in-law either, and on account of his infirmity of speech gave him Aaron (q.v.) as his prophet, while he himself was to be a god to Pharaoh. Moses then started for Egypt with his wife and his son Gershom (q.v.). On the way Yahwe met him and sought to kill him, but was pacified when Zipporah circumcised her son and cast the foreskin at His feet.

In Egypt Moses demanded of Pharaoh that he let his people go into the wilderness to celebrate a festival to Yahwe. But in spite of the miracles he wrought, which were in part successfully imitated by the Egyptian magicians, Pharaoh's heart was hardened, and he would not accede to the request. Moses therefore performed with his rod or his outstretched arm a series of miracles, including the change of the water in the river into blood, plagues of frogs, lice, flies (probably a duplicate of the lice), murrain, boils (probably a duplicate of the murrain), hail, locusts, and darkness, and culminating in the slaying of the first-born of man and beast. None of these blows affected the Hebrews in Goshen. (See PLAGUES OF EGYPT; PASSOVER.) Pharaoh at last yielded, and Moses led the people, consisting of 600,000 armed men, besides women, children, and a mixed multitude joining them, by way of Succoth (q.v.), Etham, and Pi-hahiroth to the Sea of Sedges, probably a branch of the Red Sea (q.v.). Pursued by the Egyptian army, the Hebrews seemed to be caught in a cul de sac; but Moses stretched out his arm over the sea, and Yahwe made the sea dry land, the waters standing up as a wall on the right and the left, while the people crossed over. The Egyptians were drowned by the returning waters. Having thus delivered his people, he led them by way of Shur, Marah, and Elim to the wilderness of Sin, providing them miraculously with quail and manna (q.v.) to eat and water from the rock which he struck with his rod. At Rephidim (q.v.), Amalek (q.v.) was defeated. As Moses and the people approached Sinai, they met Jethro, who had with him Zipporah and her sons, Gershom and Eliezer. Jethro rejoiced with Moses over the deliverance that had been wrought and offered sacrifices to God.

From the top of Mount Sinai, Yahwe spoke to Israel amidst lightning, thunder, and smoke. As the people could not endure this, Moses went up into the mountain and was alone with Yahwe 40 days and 40 nights, receiving the tablets of stone on which Yahwe wrote the Ten Commandments (see DECALOGUE), as well as many other laws, and directions as to the construction of the tabernacle (q.v.). Meanwhile Aaron made a golden calf (q.v.), which the people worshiped. When Moses descended from the mountain and saw this, his indignation was such that he broke the tablets of stone; but he afterward interceded for the people, who were spared after 3000 had been slain by the Levites. Moses then went up again into the mountain, where he spent 40 days and 40 nights with Yahwe, neither eating bread nor drinking water during this time. As he descended with new tablets on which he had written the Ten Commandments his skin emitted rays, so that he must henceforth put on a veil when he spoke to Israel. While Yahwe did not allow him to see His face, He graciously permitted him to see His back. The tabernacle was constructed by Bezaliel, a sacrificial code was given, Aaron and his sons were installed in the priesthood, dietary laws and a holiness code were promulgated, a census of the holy people was taken, and Moses led the people from Mount Sinai towards the promised land. On the way Eldad and Medad prophesied, and Moses refused to censure them for it. At Hazeroth, Miriam and Aaron opposed Moses because of the Cushite woman whom he had married. Miriam was therefore stricken with leprosy, but recovered when Moses interceded on her behalf.

Israel then settled at Kadesh Barnea (q.v.). From there Moses sent forth spies, whose re-

ports discouraged the people. A rebellion started by the Levite Korah and the Reubenites Dathan, Abiram, and On was severely punished; the earth opened itself and swallowed up these men, with their families and their supporters, 250 men were consumed by a fire that went out from Yahwe, and on the following day 14,700 were stricken by a plague because they murmured. When the people requested Moses to give them water, he did indeed strike the rock and produce water, but acted so proudly and failed so completely to glorify Yahwe in the matter that he was severely rebuked for it. Miriam died and was buried at Kadesh Barnea, and Aaron died at Mount Hor, or at Moserah. Since Edom refused to let the people pass through its land, it was necessary to go around by the Sea of Sedges, clearly the Gulf of Akabah (q.v.), in order to invade the land of Moab, then largely in the hands of Sihon, King of Heshbon. On the way the people suffered from the bites of serpents, until Moses set up a brazen serpent (q.v.), which brought healing to those who looked up to it. The Arnon was crossed, Beer was captured, Sihon was conquered, and Heshbon fell into the hands of Israel, as well as somewhat later the Kingdom of Og in Bashan. Nothing could check the progress of Moses and his people. Balaam (q.v.), who was called by Balak to curse, was obliged to bless Israel, and the Midianites who seduced Israel to worship Baal Peor were utterly routed. In the land of Moab, Moses gave his farewell address, proclaimed some additional laws, saw the promised land of Canaan from the top of Pisgah, was buried in the valley at the foot of Mount Nebo by Yahwe Himself, so that no man knew his grave, and was mourned by Israel 30 days. As he reached the age of 120 years, his death, according to the biblical chronology, occurred c.1456 B.C.

Further details are added in later writings. Thus, the name of the Egyptian Princess is given as Merris by Artapanus (in Eusebius, *Præp. Ev.*, ix, 27), who says that she was the childless wife of Chenephres, King of Upper Egypt, and also declares that Moses invented the alphabet, the various arts and sciences, philosophy, and certain forms of Egyptian worship, and won great victories as a military commander in Ethiopia. Josephus (*Ant.*, ii, ix, 2 ff.) gives the name of his foster mother as Thermutis and that of the Cushite wife as Therbis, the daughter of the Ethiopian King. Two of the Egyptian magicians who withstood Moses are mentioned in 2 Tim. iii. 8 as Jannes and Jambres (q.v.), and his acquaintance with all the wisdom of the Egyptians is recorded in Acts vii. 22. According to Paul (Gal. iii. 19), the Law was given by the hand of angels. Josephus declares in reference to his end that "a cloud suddenly stood over him, and he disappeared, though he wrote in Scripture that he died, which was done from fear lest people might say that because of his extraordinary virtue he had been turned into a divinity" (*Ant.*, iv, viii, 48). According to Jude (vs. 9), the archangel Michael disputed with the devil about the body of Moses; this statement was regarded by Clement of Alexandria, Origen, and Didymus as a quotation from *The Assumption of Moses*. Our Latin text of this work calls him "the great angel" (cf. Ecclus. xlv. 2: "he made him glorious as a god") and announced that "all the world is his sepulchre" (xi. 8). The conception of his translation into heaven seems to underlie his appearance with Elijah in Matt. xvii. 3 ff., and possibly also the description of the two witnesses in Rev. xi. 6. Numerous episodes in his career are described in rabbinical literature.

Besides the Pentateuch, many other works are ascribed to Moses, such as Psalm xc, the Book of Job (so *Baba bathra*, 15 a), the Book of Jubilees (see APOCALYPTIC LITERATURE), the Assumption of Moses (see APOCRYPHA), the Testament of Moses, probably preserved in the part of the Assumption of Moses now extant in a Latin version, and the Sacred Apocryphal Book of Moses called the Eighth or Holy Book, preserved in a Leyden papyrus. It has also been maintained in the Jewish synagogue that part of the revelation of God to Moses was not written down by him, but handed to posterity by way of tradition, and that this "oral law from Sinai," having been faithfully transmitted, was committed to writing in Mishna and Talmud (qq.v.). In regard to most of these works scholars are practically agreed to-day in rejecting their claims to Mosaic authorship. Concerning the Pentateuch there is no absolute consensus of opinion. Though the Roman Catholic church has officially affirmed the essential Mosaic authorship of the Pentateuch, it may be held, and is maintained, by many eminent Catholic scholars that there is not only pre-Mosaic, but also post-Mosaic, material in this work. Not a few Protestant and Jewish scholars believe that there are certain sections that were actually written by Moses, and there is an inclination on the part of some of these scholars to assume that Moses wrote on clay tablets in the Babylonian language and the cuneiform script, known at the Egyptian court in the fifteenth century, as the Tel el Amarna letters show, and that his accounts were some centuries later translated into Hebrew and copied in the North Semitic alphabet. A very large number of investigators, however, find this improbable and reject wholly the Mosaic authorship of the Pentateuch. The vast majority of these scholars, as well as some belonging to the former class, believe that the work is made up of four literary strata, consisting of documents, designated as Yahwistic, Elohistic, Deuteronomic, and Priestly, and conceived of as gradually expanding in successive editions until they were united in the work we now possess. The difference of the divine names in the Masoretic text, to which Astruc called attention in 1753, is still largely, though by no means exclusively, used as a criterion in separating these documents. According to a very generally held view, the Yahwistic document was originally written c.850 B.C. and expanded c.750, the Elohistic in its earliest form c.750 and in a later edition c.650, Deuteronomy in 620, and the Priests' Code after the exile, possibly not before Ezra (q.v.).

Assuming the correctness of the analysis and the tentative dates, the earliest biography of Moses, not yet containing the infancy story, the distinct Egyptian coloring of the plagues, and the emphasis on the miraculous, would have been written about 600 years after the traditional date of his death. The attempt to place the Exodus in the time of Mer en Ptah (1244–1232 B.C.), abandoning the biblical chronology, which might be supposed to be artificial, promised for a while a reduction of the distance to 300 years; but the discovery of an inscription

by this King representing Israel as settled in Canaan and suffering from an invasion of Palestine, which seems to have occurred in the reign of Ramses II (1310–1244), and the light thrown upon the advance of the Hebrews already in the Amarna period, have tended to render this late date wholly improbable. (See JEWS.) In spite of the absence of any written sources, the silence concerning Moses in early prophetic oracles, and the contrast between the Mosaic laws and the practice of even pious Yahwe worshipers, many students have leaned upon the assumed oral tradition and endeavored to present on the basis of it a picture of the life and work of Moses. Scholars like Gressmann and Gunkel have recently urged as arguments in favor of the historical character of Moses the Song of Miriam, the still-remembered volcanic nature of Sinai, the pillar of fire and cloud which seems to them likewise to betray the memory of the volcanic character of Sinai, the knowledge of the fact that Israel was not indigenous in Palestine, the references to Ramses and Pithom, the Egyptian names of Moses and Phinehas, the friendly relations to the Midianites, the struggles with Amalek, the conquests of the Amorites in the East Jordan country, and the difficulty of accounting for the union of Israel and the close relation between Yahwe and Israel without such a founder as Moses may be supposed to have been.

Against the validity of these arguments various objections have been raised, especially by Cheyne, Winckler, Eduard Meyer, and N. Schmidt. The Song of Miriam seems to be only a repetition of the first two lines of the Song of Moses, which is generally regarded as late. Even if the volcanic nature of Sinai were more unmistakably indicated than it is, the knowledge of its character would not be strange, seeing that pilgrimages were apparently made to it even in the time of Elijah. As the pillar of fire appears long before the arrival at Sinai, it does not seem to be connected with the nature of this mountain. Living for centuries among the gradually subdued Amorites, Canaanites, and Hittites, Israel must have been conscious of being invaders; but the historic character of Moses does not appear to follow from a recognition of this fact. Since the cities of Pithom and Ramses were built by Ramses II, these names point to a period much later than that which the biblical date and historic considerations alike suggest for the Hebrew invasion. There is no convincing evidence that either Moses or Phinehas is an Egyptian name. Memories of early relations with Midian and Amalek may have existed without involving the character of Moses. The Songs of the Conquest, which may be among the oldest poems in Israel, seem to mention the crossing of the Sea of Sedges as well as the Arnon, and the capture of Beer and Heshbon, but there is no reference to Moses. The historian Eduard Meyer complains that "among those who treat him [Moses] as an historical figure none has been able to give him any content, to present him as a concrete individuality, or to indicate anything he did, or wherein his historic work consisted; since to say that he made the statement that Yahwe was Israel's god is only to use an empty and meaningless phrase"; he regards Moses as the mythical ancestor of the priests of Kadesh, "a figure of the genealogical saga, connected with the cult, and not an historical personality." (*Die Israeliten*, p. 451, Halle, 1906.) The references to Moses as a god (Ex. iv. 16, vii. 1), his face as emitting rays (or "having horns," so the Vulgate and, according to Jerome, Aquila; hence the representation of Moses by Michelangelo as horned), and his wearing a veil to hide his face, having even been interpreted as surviving signs of an originally divine figure, to which the name Deliverer would be altogether suitable.

In recent years a reaction has set in against the prevalent system of Pentateuchal analysis on the ground of the inadmissibility of the divine names as a documentary criterion, the inadequacy of other marks of distinction, the indications of a diaskeuastic activity in ways not hitherto considered, and the independence and higher age of numerous songs and sagas. Concerning this latest phase of criticism, represented by Eerdmans, Wiener, Dahse, and Schmidt, as well as the history of critical study in general of the books ascribed to Moses, and the division of the material among the currently assumed documents, see PENTATEUCH. The more searching textual and historical criticism now demanded may incidentally produce great uncertainty as to stratum of tradition and relative date where for some time everything has seemed to be definitively settled, and impose suspense of judgment; but it is by no means impossible that it may ultimately lead not only to a more correct view of the growth of a wonderful literature, but also to an actual increase of knowledge and a more accurate appreciation of the figure of Moses.

There is as yet no external evidence of any kind that is of real importance. The number of Greek and Roman historians who mention Moses and the expulsion of the Jews from Egypt is indeed considerable. Among them are Hecatæus of Abdera, Manetho, Posidonius, Lysimachus, Chæremon, Trogus, Strabo, Diodorus, Tacitus, and Plutarch; but even their combined testimony has little weight. The later writers depend on the earlier, and some of these may easily have picked their crumbs of learning in the Jewish ghetto at Alexandria. Hecatæus and Manetho are the most important. It cannot be said to be impossible that the former was told by Jews that their fathers were driven out of Egypt because the gods were angry with them, and that the common mass of the expelled became their ancestors, while the flower of the people went to Hellas (fragment in Diodorus, xl, 3); but nothing of historic importance can be extracted from it. Manetho evidently identified the Hebrews with the Hyksos, and some personality called Osarsiph of the Hyksos period with Moses. Whether he found this name in his story, which is genuinely Egyptian and may have been of considerable age, we have no means of knowing. In itself it is not at all improbable that Habiri-Hebrews came into Goshen while the Hyksos occupied Egypt, and that they were driven out of their dwelling places in consequence of the expulsion of the Hyksos. (See JEWS.) But Manetho's statement is too late and comes to us through channels that are too dubious to inspire confidence.

Bibliography. Consult the histories of Ewald, Renan, Stade, Kittel (2d ed., Gotha, 1909–12), Guthe, Buhl, Köhler, Winckler, Piepenbring, Kent, Klostermann, Wellhausen (7th ed., Berlin, 1914); also the commentaries on Exodus, Leviticus, Numbers, and Deuteronomy enumerated in the articles on these books; the biblical

theologies by Schultz, Dillmann, Stade, Smend, Marti, and others; the introductions to the Hexateuch by Kuenen, Wellhausen, Westphal, Holzinger, and Carpenter-Battersby; the general introductions to the Old Testament by Cornely, Kaulen, Baudissin, Cornill, Driver, Sellin, and others; Nathaniel Schmidt, "The External Evidence of the Exodus," in *Hebraica* (Chicago, 1894); Karl Budde, *Religion of Israel to the Exile* (New York, 1899); S. R. Driver, in *Authority and Archæology* (London, 1899); T. K. Cheyne, "Moses," in *Encyclopædia Biblica* (ib., 1902); Wilhelm Spiegelberg, *Aufenthalt Israels in Aegypten* (Leipzig, 1904); Eduard Meyer, *Die Israeliten und ihre Nachbarstämme* (Halle, 1906); Paul Volz, *Moses* (Berlin, 1907); Nathaniel Schmidt, "Jerahmeel and the Negeb," in *The Hibbert Journal* (London, 1908); Eerdmans, *Alttestamentliche Studien*, vol. ii (Giessen, 1910); C. F. Lehmann-Haupt, *Israel* (Berlin, 1911); Hugo Gressmann, *Moses* (ib., 1913); J. F. H. Gunkel, "Moses," in *Die Religion in Geschichte und Gegenwart* (Tübingen, 1913). For the mass of legends that gathered around Moses, see Gustav Weil, *Biblische Legenden der Muselmänner* (Frankfort, 1845); Beer, "Das Leben Moses nach Auffassung der jüdischen Sage," in *Jahrbuch für die Geschichte der Juden und des Judenthums*, vol. iii (Leipzig, 1863); Lauterbach and Kohler, "Moses," in *The Jewish Encyclopædia* (New York, 1905).

MOSES. A colossal statue in the church of San Pietro in Vincoli, Rome, one of the most famous works of Michelangelo. The gigantic figure is seated in the attitude of one about to spring to his feet. The left hand is pressed to the body to restrain his indignation at the worship of the golden calf, at which he appears to gaze with flashing eyes and frowning face, while the right hand grasps the tables of the law. The head shows two short horns, based on a mistaken interpretation of Ex. xxxiv. 29. The "Moses" was one of 30 proposed statues for the tomb of Pope Julius II in St. Peter's, which was not completed. See Plate under MICHELANGELO.

MOSES, ASSUMPTION OF, and REVELATION OF. See APOCRYPHA, *Old Testament;* also ASSUMPTION OF MOSES.

MOSES, BELLE (?–). An American author. She was born at Savannah, Ga.; graduated from Home College at Montgomery, Ala.; and became a contributor to newspapers and magazines. She is author of *Louisa M. Alcott, Dreamer and Worker* (1909); *Lewis Carroll in Wonderland and at Home* (1910); *Charles Dickens and his Girl Heroines* (1911); *Helen Ormesby* (1912).

MOSES, BERNARD (1846–). An American writer on political science, born at Burlington, Conn. He graduated at the University of Michigan in 1870, studied at Heidelberg (Ph.D., 1873), and was professor of history at Albion College in 1875. In 1876 he was appointed professor of history and political science at the University of California. He served as a member of the United States Philippine Commission in 1900–02. He is author of *Politics* (1884), with W. W. Crane; *The Federal Government in Switzerland* (1889); *The Railway Revolution in Mexico* (1896); *Democracy and Social Growth in America* (1898); *The Establishment of Spanish Rule in America* (1898); *Government of the United States* (1906); *South America on the Eve of Emancipation* (1908); *Spanish Dependencies in South America* (1915).

MOSES, MONTROSE JONAS (1878–). American author, born in New York, where he graduated from the City College in 1899. He early took up editorial and literary work, the drama and literature for children being his special interests. Between 1900 and 1910 he was connected editorially with, or was a contributor to, various periodicals: the *Literary Digest*, the *Reader*, the *Independent*, the *Book News Monthly*. Besides editing the *Green Room Book* and the *Anglo-American Dramatic Register* and making some translations from the French, he wrote: *Famous Actor Families in America* (1906); *Children's Books and Reading* (1907); *Henrik Ibsen* (1908); *The Literature of the South* (1909); *The American Dramatist* (1911); *Maurice Maeterlinck: A Study* (1911).

MOSES BEN MAIMON BEN JOSEPH. See MAIMONIDES.

MOSES OF CHORENE, kŏ-rē′nē. An Armenian author of the fifth century. Of the works ascribed to him the most important are *A History or Genealogical Account of Armenia Major* (to 442 A.D.), a small *Geography of Armenia*, and a *Rhetoric*. Their authorship, however, is uncertain, most critics assigning the *Geography* to the seventh century, while the *History* is by some (Gutschmid, Khalatiants, Carrière) held to be a work of the seventh or eighth century and by others (Gutschmid at one time, Baumgarten, Conybeare) to have originated in the fifth century, being largely interpolated in later ages. The style of the *Rhetoric* differs from that of the other two works, and Conybeare thinks it is a genuine work of Moses of Chorene. From the *History* it appears that the author was born at Khor'nī, in the Tarom district, and was a pupil of the Patriarch Sahak the Great and of Mesrob, the inventor of the Armenian alphabet. After 431 he was sent by them to Alexandria to study Greek literature and visited Palestine, Italy, Athens, and Constantinople. He later became Archbishop of Pakrevant and died about 492 A.D. Later tradition added to his fame, and numerous works came to be ascribed to him. The *History*, which at one time stood high in the opinion of critics, is now little trusted. It is important for the light it throws on the religious history and folklore of early Armenia. It was published, along with the *Geography*, at Venice (1843, 1865) and, with Latin translation, by the brothers Whiston (London, 1736). The *History* has been translated into French by De Florival (Venice, 1841) and Langlois (Paris, 1869), German by Lauer (1869), Italian by the Mechitarist Brothers at Venice (1841), and Russian by Emin (Moscow, 1858). The *Geography* is available in French (trans. by Vivien Saint-Martin, 1818, and Soukry, 1881); the best edition, however, is that of Patkanov (St. Petersburg, 1877, with Russian translation). Consult: Khalatiants, *Armenskie Epos Moiseia Khorenskago* (Moscow, 1869); Von Gutschmid, *Ueber die Glaubwürdigkeit der armenischen Geschichte des Moses von Khoren* (Leipzig, 1876); Carrière, *Moïse de Khoren* (Paris, 1891); id., *Nouvelles sources de Moïse de Khoren* (Vienna, 1893; supp., 1894); the articles of F. C. Conybeare, in *Byzantinische Zeitschrift*, vols. x, xi (Leipzig, 1901–02); the works enumerated by Chevalier, *Répertoire des sources historiques du moyen-âge; Bio-Bibliographie*, vol. ii, col. 3271 et seq. (Paris, 1907).

MOSETENAN, mō′sā-tā′nan. The language

of the Indians of northwestern Bolivia, South America, living on the Río Beni and its tributaries, between the fourteenth and sixteenth parallels of south latitude. Consult: N. Armentia, *Los Indios Mosetenes y su lengua* (Buenos Aires, 1903), and A. F. Chamberlain, in *Journal de la Société des Américanistes de Paris*, vol. vii (N. S., Paris, 1910).

MOSGU, mōs'kōō, or **MUSGU.** Pagan negroes in the Chad basin, Sudan, south of the lake, between the Shari and Logone rivers. Their number is estimated at 35,000. Together with the Logonese and other tribes, related to them but politically independent, they form the Masa family. Their habitations are highly distinctive conical clay structures studded at regular intervals with curious protuberances which enable the natives to climb to the top. The Mosgu are both fishermen and cultivators of the soil; their agricultural implement is the hoe, and they are acquainted with the use of manure. The women are deformed by immense wooden disks inserted into both lips. Unlike neighboring Mohammedan peoples, the Mosgu have a rather imperfect political organization; each individual is more or less independent of his neighbors, and the chiefs have little influence. Thus they have fallen prey to the slave raiders from Bornu. Consult: Henry Barth, *Travels and Discoveries in North and Central Africa*, vol. iii (New York, 1857); H. K. W. Kumm, *From Hausaland to Egypt* (London, 1910); Mohn, "Das deutsche Tschadseegebiet, Land und Leute," in *Jahrbuch des städtischen Museums für Völkerkunde zu Leipzig* (Leipzig, 1911); Adolf Friedrich, Herzog zu Mecklenburg, *Vom Kongo zum Niger und Nil* (ib., 1912).

MOSHEIM, mōs'hīm, Johann Lorenz von (1694–1755). A distinguished German Church historian and theologian. He was born at Lübeck, Oct. 9, 1694, and studied at Kiel. In 1723 he became ordinary professor of theology at Helmstedt and in 1747 at Göttingen, where he died as chancellor of the university, Sept. 9, 1755. His theological works are numerous, among them a work on Bible morality, *Sittenlehre der heiligen Schrift* (1735–53; 4th ed., 1753–61; continued by J. P. Miller, 1770–78), and discourses, *Heilige Reden* (1732; 4th ed., 1765). But his contributions to theological literature in the department of ecclesiastical history are most important, by reason of their great learning, fullness, and accuracy. The following have been translated from the original Latin: *Christian Church in China* (London, 1862); *Commentaries on the Affairs of Christians before the Time of Constantine the Great* (ib., 1813–15); *Institutes of Ecclesiastical History* (Murdock's trans., ed. by W. Stubbs, 1862; new ed., Boston, 1892); his valuable *Versuch einer unparteiischen Ketzergeschichte* (1746–48) is untranslated.

MOSHER, mō'zhĕr, Harris Peyton (1867–). An American laryngologist, born at Woodfords, Me. He received his education at Harvard University (A.B., 1892; M.D., 1896). Opening an office in Boston, he became connected with several hospitals. He joined the staff of his alma mater as instructor in anatomy and was later appointed professor of laryngology. At Harvard he founded a museum illustrating the normal anatomy of the nose and throat and accessory sinuses and their variations. He also conducted annually a graduate course on these subjects. Mosher became successful as an operator and devised the exenteration of the ethmoidal labyrinth; the approach to the cavernous sinus by the orbital route; an intranasal operation for drainage of the lachrymal sac and the tear duct; etc. He also originated instruments for direct intubation, an adjustable speculum for direct inspection of the larynx, a spiral wire papilloma extractor, a ballooning œsophagoscope, a tube for closing safety pins in the trachea or œsophagus. Mosher contributed numerous articles to professional journals.

MOSKVA, mŏs-kvä'. A river of European Russia, a left affluent of the Oka, which is itself an affluent of the Volga. It rises in the Government of Smolensk, flows eastward through the city of Moscow, and joins the Oka near Kolomna, in the Government of Moscow, after a course of 285 miles. It is navigable for small vessels between Moscow and the Oka, a distance of 112 miles, and is an important commercial route. On its banks, Sept. 7, 1812, occurred the famous battle of the Moskva or Borodino between the Russians and Napoleon.

MOSKVA, Prince of the. See Ney, Michel.

MOSLEM, mŏz'lĕm, or **MUSLIM,** mŭz'lĭm. A common designation in the West for a Mohammedan. It comes from the Arabic *muslim*, a derivative of *salima*, 'to be safe,' which is often used by Mohammed in the sense of 'self-resigned,' 'submissive,' 'a follower of Islam,' generally in contrast to *kāfir*, an unbeliever, infidel. The name Mussulman, often used in the same sense, is derived from the Persian plural of *muslim* (*muslimān*). See Islam; Mohammedanism.

MOSLEM ART. See Mohammedan Art.

MOSLER, mōz'lĕr, Henry (1841–1920). An American genre painter, born in New York City. He studied in Cincinnati under J. H. Beard, in Paris under Hébert, at the Munich Academy under Wagner, and in Düsseldorf. He became especially well known in Paris, where he lived many years and exhibited much. Though appealing to popular taste, his work is frequently deficient in draftsmanship and color. He won various awards, including gold medals at the International Exposition at Nice (1884), at Atlanta (1895), and at Charleston (1902), and the cross of the Legion of Honor. His more notable works include: "The Return" (1879), the first painting by an American to be bought by the French government for the Luxembourg; "Wedding Feast in Brittany" (Metropolitan Museum, New York); "Saying Grace" (Corcoran Gallery, Washington); "Rainy Day" (Pennsylvania Academy); "Wedding Morning" (Sydney Museum, Australia).

MOSQUE, mŏsk (Fr. *mosquée*, from Sp. *mezquita*, from Ar. *masjid*, temple, from *sajada*, to prostrate one's self, to pray). A Mohammedan house of prayer and worship. Examples of these buildings are found wherever the Mohammedan faith has prevailed, from Spain to India and Turkestan. There is no fixed form of structure for them; in poor communities a bare room provided with a *miḥrāb* (prayer niche) to mark the *kiblah* (q.v.) often serves the purpose. In general the earliest type of mosque was an open court, surrounded on three sides by an arcaded portico, of a single or rarely a double row of arches on columns or piers, and having at the side of the court towards Mecca the open prayer hall composed of similar arcades, with more

rows of supports; it contains the *miḥrāb* and to the right of it the *mimbar* (pulpit), and, in front, generally a platform and reading desk. In the open court (*ṣaḥn*) is the fountain for ablutions, an indispensable feature of every mosque inclosure, often of large size and covered with a dome. This is the typical mosque plan until the fourteenth century. All the early mosques of Cairo and the great mosques of Kairwan, Mecca, Medina, Damascus, etc., were of this type.

The mosques of India and Central Asia are also generally constructed after this plan. The Mohammedans, however, have always been influenced by the native forms of architecture in the different countries which they have entered. The Spanish mosques, e.g., closely resembled churches, having many parallel aisles supported on a forest of columns like the old Cordova mosque, or fewer aisles, like the mosque at Toledo, now San Cristo de la Luz. The dome was not used to any extent till the thirteenth century, when the new type of the mausoleum mosque, derived perhaps from Persian domical tombs, made its appearance. Already as early as 1201 the dome had appeared in the Bibars and Imam Shaffeij mosques at Cairo. But the masterpiece of the type is the Hasan mosque at Cairo (1356), followed by those of Barkuk, Khawand al Baraka, and others. In the fifteenth century appeared the second or Turkish type, based on Hagia Sophia (see Plate of ST. SOPHIA), of which there are several superb examples at Constantinople (Mehmet II, Suleiman, Ahmet, and others); at Adrianople (of Selim I); an earlier one at Isnik, and the model spread even to Egypt, as in the Sinan mosque at Bulak. Still another type of dome appeared in certain mosques of India of the Mogul period (after 1496), based on Persian models, as in the Jumma Musjid at Delhi, the Muti Musjid at Agra, and the stupendous mosque at Bijapur. Among the most famous and sacred of the early mosques were the Masjid al Ḥarām at Mecca (q.v.), the Masjid al Nabī at Medina (q.v.), the Masjid al Āḳsā, the Mosque of Omar at Jerusalem (see Plate of JERUSALEM), and the great Mosque of Walid at Damascus. All of these have been rebuilt, so that their early form is no longer recognizable. The old mosque at Kairwan (q.v.) is a well-preserved early example (eighth century), as is also the Mosque of Tulun at Cairo; the Mosque of Amru at Cairo is of even earlier foundation, and still retains portions of old work. The Mosque of Omar represents the concentric mausoleum type. It is now two or three centuries since mosques of any architectural importance have been erected. The poorer mosques have bare whitewashed walls with no decoration of any kind. The larger and more pretentious are often elaborately and artistically decorated with carvings, arabesques, and passages from the Koran in the most involved style of ornamental calligraphy. Hundreds of oil lamps and sometimes ostrich eggs, elephants' tusks, and the like hang from the ceiling. The floor is usually covered with matting. A striking feature of mosque architecture is the minaret (q.v.).

The five prayers are said in the mosque daily. (See MOHAMMEDANISM.) The worshiper before entering performs the necessary ablutions, removes his shoes, carries them in his left hand, sole to sole, puts his right foot first over the threshold, and takes his place in the congregation facing the *miḥrāb*. The attendance is more general on Friday, when some special prayers are said and a sermon (*khuṭbah*) is often added. A mosque which has this service is called *masjid al jāmi'* (mosque of the general assembling) or simply *jāmi'*. The *khuṭbah*, as well as religious proclamations, is generally pronounced on or from the *mimbar*, a narrow and lofty pulpit, with a steeple-like cap; it stands at the right of the *miḥrāb* and is reached by a steep flight of steps. Women are not forbidden to enter the mosque, but their presence is not considered seemly during the time of prayer; sometimes a special place, secluded by a screen, is provided for them. There are few mosques to which unbelievers do not now have access. The utmost decorum and solemnity are observed during services, and the mosques are deeply reverenced by the faithful, yet when services are not going on they serve as general gathering and lounging places and as resting places for travelers and wanderers. It has been the custom from the beginning for teachers and professors to give lectures and hold classes in the larger mosques, which thus serve as college buildings. The teacher takes his place at a pier or column at stated hours, his favorite pupil holds his books or notes, and the audience sit around on mats. Several such courses are carried on simultaneously in different parts of the covered arcades. Until madrasahs (see MADRASAH) were built in the eleventh century, the mosques were probably the only regular seats of advanced teaching. In recent times the advanced education in the mosques has been largely confined to the preparation of candidates for the position of imam, but there are still notable exceptions. The Azhar mosque in Cairo, the only survivor of many fine mediæval institutions, has long been the main centre of advanced instruction in Mohammedan countries, and its courses are attended by between 5000 and 10,000 students. Minor buildings, such as schoolrooms, academies, libraries, hospitals, dormitories, public kitchens, and almshouses, are often connected with the mosques. Attached to the Imperial mosques at Constantinople and at Brusa are also *turbeh*, or mausoleums of sultans; some of them (e.g., that of Sŏlíman) are of great magnificence.

The revenues of the mosques are derived not only from the contributions of the faithful, but also from investments in landed property (*wuḳūf*), often from gifts made centuries ago; this property is in the hands of trustees. The income serves to keep the buildings in repair and to pay necessary expenses. The mosque officials and attendants include the imam, who leads the prayers; the learned men, who teach (*mawlawī, 'ulamā*); the *khatib*, or preacher (in a *jāmi'*); the muezzins (see MUEZZIN), who call to prayers; doorkeepers, lamplighters, etc. Their number depends entirely upon the revenues; sometimes a single imam combines in his person the functions of all the others. The imam has a salary from the revenues, but the teachers are dependent entirely upon the gifts of their pupils. See MOHAMMEDANISM. Consult: Marcel Dieulafoy, *L'Eglise et la mosquée* (Paris, 1909); S. H. Leeder, *Veiled Mysteries of Egypt and the Religion of Islam* (London, 1912); G. L. Bell, *Palace and Mosque at Ukhaidir* (Oxford, 1914). Cf. MOHAMMEDAN ART, *Bibliography*.

MOSQUERA, môs-kā'rä, TOMÁS CIPRIANO DE (1798–1878). A Colombian soldier, statesman,

and scientist, born in Popayán. He served with distinction in the wars of independence; at 31 was a general; was sent as Ambassador Extraordinary to Peru; and in 1833 was made Senator. As President from 1845 to 1849 he promoted the country's development, fostered science and education, encouraged public improvements, and maintained the credit and finances of the nation on a sound basis. A tolerant conservative, he became the leader of the Liberal party and headed a successful revolt against the government in 1859. He assumed the dictatorship in 1861 and called a congress which formed a new federal constitution. Mosquera was then reëlected President and continued the policy of his earlier administration. He was deposed and banished in 1867 for arrogating to himself the power of adjourning Congress. He returned to Colombia two years later and became Governor of Cauca and a Congressman. His writings include *Memorias sobre la vida del libertador Simon Bolívar* (1853); *Memoir on the Political and Physical Geography of New Granada* (1853); *Compendio de geografía de Colombia* (1866).

MOSQUE (mŏsk) **SWALLOW.** One of a group of related Asiatic and North African swallows within the genus *Hirundo*, whose prevailing colors are blue, with chestnut on the rump and side of the head and buff or brownish streaked breasts. They are familiar town swallows wherever they occur, and take their English name from the habit of placing their nests commonly on the walls and minarets of mosques. These nests and their eggs are much like those of the American eaves swallow. The commonest Oriental species are *Hirundo daurica* and *Hirundo nepalensis*, and a conspicuous African one of large size is *Hirundo senegalensis*. Consult Sharpe and Wyatt, *Monograph of the Hirundinidæ* (London, 1885–94), and authorities upon East Indian birds cited under Bird.

MOSQUITÍA, mōs'kē-tē'ä. A strip of territory on the east coast of Central America. See Mosquito Coast.

MOSQUITO, mos-kē'tō (Sp., Portug. *mosquito*, dim. of *mosca*, fly, from Lat. *musca*, fly). A biting fly of the family Culicidæ. These flies belong to the group of nematocerous Diptera, and their nearest allies are the crane flies, the midges of the families Dixidæ, Stenoxenidæ, and Chironomidæ, the fungus gnats, gall gnats, and moth flies, from all of which true mosquitoes are distinguished by the fact that the veins of the wing and the body itself bear flattened scales, readily perceived under a low power of the microscope. The family is a large one and the number of described species has doubled

A FEMALE MOSQUITO (*Culex*).

within the last few years, since especial attention has begun to be paid to this group, and activity in research is now so great that it is probable that the number of species may again be doubled before the mosquito fauna of the globe is fairly well known.

Geographic Distribution. The mosquitoes form a cosmopolitan group and extend practically to all known portions of the globe. Certain species are excessively abundant in the Arctic regions, while the greatest number of species is to be found in the tropical and subtropical life zones. Certain of the genera are very widely distributed, the typical genus, *Culex*, being found practically everywhere. *Anopheles* is represented in all regions except the Boreal and the Arctic; *Stegomyia* occurs in southern Europe, North, South, and Central America, West Indies, Africa, India, Malay Archipelago, eastern Asia, and Australasia. A similar distribution is found with others of the less conspicuous genera. Certain species are also of almost world-wide distribution, and this is doubtless largely due to the ease and frequency with which mosquitoes are transported by seagoing vessels and by railway trains, and to the extraordinary facility with which they accommodate themselves to a novel environment. It is a well-substantiated fact, e.g., that there were no mosquitoes in the Hawaiian Islands until they were brought there by sailing vessels. Certain species have a remarkable range through different life zones, and the group as a whole has only a slight faunistic value. For example, *Culex pipiens*, the "rain-barrel" mosquito, occurs throughout Europe from Scandinavia to Malta, all over North and Central America and the West Indies, and is also found in Oriental regions.

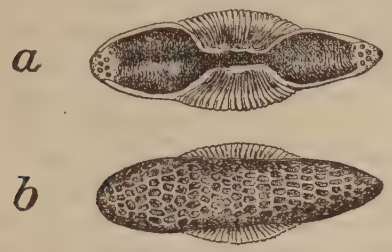
MOSQUITO OF MALARIA (*Anopheles maculipennis*).

Classification. The family has been divided by Theobald into six subfamilies. Anopheles, Megarhinus, Culex, Ædomyia, Trichoprosoön, and Corethra being the typical genera of these subfamilies. The last named, however, has a short proboscis not formed for piercing, and does not belong to the biting mosquitoes proper. The characters which have been relied upon mainly in the differentiation of the genera have been the comparative length of the palpi in the different sexes, the character of the terminal joints of the palpi, the relative proportions of certain of the cells of the wings, the characters of the scales of the legs and head, the bristles upon the metanotum, and certain other points connected with the relations of the veins of the wings. The species for the most part have been separated upon colorational characters, although certain characteristics of the wing venation are specific rather than generic, and the study of the body scales reveals specific characters. There are also some interesting characters

MOSQUITO OF YELLOW FEVER (*Aëdes calopus*).

connected with the teeth of the foot claws which are both specific and generic.

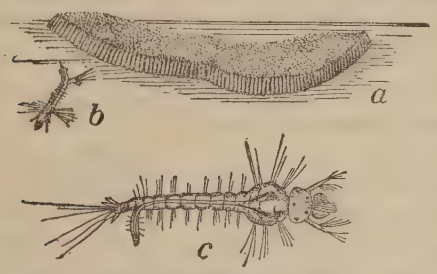
Life History. Mosquitoes in their early stages are all aquatic. The larvæ need a certain amount of standing water for their development. The eggs are laid by the adult insects, in the majority of cases upon the surface of



EGG OF ANOPHELES.

a, upper surface; *b*, under surface. These eggs float in disconnected masses. (Greatly magnified.)

standing water. They may be laid upon end, attached side by side in raft-shaped masses, as in *Culex pipiens* and as in the genus *Uranotænia*, or they may be laid singly on their sides, as in *Anopheles* and *Aëdes*. They may also be laid upon moist earth in swampy places, as with *Aëdes solicitans*, or upon the leaves of pitcher plants, as with *Wyeomyia smithii*, hatching in these cases when water eventually reaches them. The eggs of some species, as those last named and *Aëdes calopus*, will bear desiccation; but the vitality of others, as those of *Anopheles*, is destroyed when they are removed from the water for any length of time. The egg stage is short with perhaps the majority of species, but with others it is much longer, and may be the hibernating stage with certain forms. The larva is an active and voracious little creature, and is commonly known as a wiggler or wriggler. Its life as a rule is short, and with the great majority of the species it is a true air breather, coming to the surface of the water at frequent intervals and extruding its respiratory tube in order to suck air into its tracheæ. The



EGGS AND LARVÆ.

a, a raft of eggs of the common mosquito (*Culex*); *b*, a single larva (wiggler) taking breath at the surface; *c*, a larva (enlarged).

anal locomotory flaps of many species have an abundantly branched tracheal supply, and at least during part of the larval life these flaps function as air gills, rendering it possible for the larva to remain below the surface of the water for a prolonged period of time. The food of mosquito larvæ is most variable. They swallow all sorts of minute organisms which float upon the surface or are held in suspension in the water. The larvæ of *Anopheles* feed for the greater part of their life at the surface, and consequently devour mainly the spores of algæ which float there. Later in life in shallow water they descend to the bottom and feed upon heavier objects. The larvæ of *Culex* and *Aëdes* feed below the surface upon small organisms, animal and vegetable, and mineral as well, which are held in suspension. The larvæ of *Psorophora* seem largely carnivorous, and, on account of their large size, are able to overpower and to devour other mosquito larvæ and other aquatic insects. They are even cannibals, and will feed upon small individuals of their own kind. All mosquito larvæ are very active, wriggling quickly through the water by abrupt and rapid bendings of the body, aided in some cases by long lateral hairs, and especially by a well-developed group of flaps at the anal end of the body. Food is brought into the mouth by the active movement of long oral cilia. In many forms the jaws are undeveloped, but in some, as in *Psorophora*, they are well formed and adapted for piercing and tearing.

The pupa is also active, but does not feed, and possesses no mouth parts. As a rule it floats at the surface of the water, breathing through two respiratory tubes which issue from the thorax—a curious change from the respiratory tube of the larva, which is single and issues from the anal end of the abdomen. Although generally floating at the surface, the pupa when disturbed rapidly vanishes below the surface by energetic movements of the abdomen and of the anal flaps, and is thus enabled to a certain extent to avoid the attacks of fish and other enemies. The pupal stage is usually of short duration, and the adult issues through the cracking of the skin of the thorax. With many mosquitoes there are several generations annually. With *Culex pipiens*, e.g., there may be from eight to twelve such generations in a long summer, but other species, probably including *Anopheles maculipennis*, have but one. With other species it seems reasonably certain that the life duration of the individual is much greater and that in some cases there may be but a single generation each year. Some mosquitoes hibernate as adults, stowing themselves away in protected places at the beginning of cold weather; others hibernate in the egg stage, and still others as larvæ, readily standing extremes of temperature, and even emerging in good condition with the warm weather of spring from blocks of ice in which they have been solidly frozen.

Agency of Mosquitoes in Carriage of Disease. Since 1898 mosquitoes have been known to be of vital importance to the human race, following the discovery that certain of them are agents in the carriage of several diseases of human beings, notably malaria and yellow fever. Malaria is carried by *Anopheles maculipennis* (also known as *A. quadrimaculatus*) and yellow fever by *Aëdes calopus* (formerly known as *Stegomyia fasciata*). See INSECTS, PROPAGATION OF DISEASE BY.

Riddance of Mosquitoes. The most effective way of relieving a neighborhood of mosquitoes consists in abolishing the breeding places. All accumulations of stagnant water—and these are of the most varied and frequently inaccessible character—must be removed wherever it is possible. Swampy lands should be drained; hollows in old trees and stumps should be filled up; old cans and bottles should be removed; cesspools should be hermetically sealed; rain-water

barrels should be covered with fine wire gauze; the roof troughs of houses should be frequently cleaned out. No possible supply of standing water should be overlooked, and this will in many cases require a most careful and ingenious search. Where mosquitoes are breeding in troughs, fountains, or similar places, fish, such as sunfish, goldfish, or top minnows (qq.v.), should be introduced. Where ponds exist which it is not possible to drain, the water margins should be kept clean and sharp, and superabundant vegetation should be removed and the pond stocked with fish. Moreover, if the fish supply of such ponds cannot be made satisfactory, a certain amount of kerosene placed upon the surface of the water will quickly destroy mosquito larvæ. This kerosening of swamp lands, where drainage is impossible or very expensive, is often a temporary remedy of great value. In malarial regions persons may be protected from the bite of the dangerous and annoying mosquitoes by the careful screening of houses and by wearing mosquito veils and gloves at night when obliged to be out of doors. *Anopheles*, as a rule, bites only at night. By protecting healthy persons and malarial patients as well, and by the free use of quinine with the patients, the general health of the population of the Roman Campagna has greatly improved. The Germans in East Africa made efforts to wipe out malaria by simply destroying the disease with medicine. Malaria once abolished in human beings, there will be none for the mosquitoes to carry. In the United States extensive work has been done in destroying breeding places. Under such conditions malaria will die out. In Cuba, aside from protecting the early yellow-fever patients and the constant use of mosquito bars in hospitals, yellow fever has been exterminated by house-to-house work against the breeding places of *Aëdes*, this work being carried on first by the medical officers of the United States army and later by the health authorities of the Cuban government. Mosquitoes, as a rule, may be stupefied by burning pyrethrum powder (Persian insect powder). They may also be deterred from biting by anointing the skin with oil of citronella. See GORGAS, W. C.; INSECTS, PROPAGATION OF DISEASE BY; PANAMA CANAL; YELLOW FEVER.

Bibliography. L. O. Howard, *Mosquitoes* (New York, 1901); Ronald Ross, *Mosquito Brigades* (London, 1902); Theobald, *A Monograph of the Culicidæ of the World* (ib., 1901–10); G. M. J. Giles, *Gnats and Mosquitoes* (New York, 1905); E. G. Mitchell, *Mosquito Life* (ib., 1907); E. H. Ross, *Reduction of Domestic Mosquitoes* (Philadelphia, 1911); Howard, Dyar, and Knab, *Mosquitoes of North and Central America and the West Indies* (4 vols., Washington, 1913).

MOSQUITO, mŏs-kē'tō (corruption of the native name *Misskito*). A tribe which occupies the eastern coast of Nicaragua, known from them as the Mosquito Coast (q.v.). They are an intelligent people, short in stature and usually very dark in color. This latter trait is said to be due in part to admixture with negro blood from the slavers wrecked upon their coast. They number about 6000 souls. Tehmann connects their language with the Sumo group. Consult C. De Kalb, "A Bibliography of the Mosquito Coast of Nicaragua," in *Journal of the American Geographical Society*, vol. xxvi, pp. 241–248 (New York, 1894), and W. Tehmann, "Ergebnisse einer Forschungsreise in Mittelamerika und Mexico, 1907–1909," in *Zeitschrift für Ethnologie*, vol. xlii, pp. 687–749 (Berlin, 1910).

MOSQUITO BEE. Any one of several of the very small, stingless, tropical honeybees of the genus *Melipona*, which form communities, consisting at times of countless numbers. They are among the smallest of the bees, and although they do not sting, all the essential elements of the sting are present, the pointed or penetrating part of the apparatus being stunted. One species (*Trigona*, or *Melipona, mosquito*) sends off swarms after the manner of the common hive bee. The nests abound in honey, and have many enemies, since the bees cannot defend themselves by stinging. The nests, however, are rich in devices for protection and for the exclusion of intruders. Some species of them build their nests in completely with clay. See BEE.

MOSQUITO BLIGHT. A disease of the tea plant in India and Ceylon, caused by the punctures of several of the species of the genus *Helopeltis* of the plant-bug family Capsidæ. The young bugs as well as the adults feed upon the leaves and young twigs of the plant, causing them to wilt.

MOSQUITO COAST, or MOSQUITÍA. The strip of territory inhabited by the Mosquito Indians on the east coast of Central America, stretching along the Caribbean Sea from about lat. 10° 30′ N. to 13° N. and extending about 40 miles inland (Map: Central America, F 4). It is notable chiefly for the fact that it was for a time the subject of diplomatic controversy between the United States and Great Britain. From about 1655 to 1850 it constituted a protectorate under the nominal control of Great Britain, during which time various attempts were made to plant colonies there, but only with partial success. Both the Central American republics and the United States denied the claim of Great Britain to a protectorate over the Mosquito Coast, the latter particularly on account of the contiguity of the territory to the proposed interoceanic canal which the United States wished to construct or cause to be constructed. The seizure in 1848 of Greytown (San Juan del Norte), an important commercial port at the mouth of the San Juan River, in Nicaragua, by the Mosquito Indians with the aid of England, caused great excitement in the United States, and for a time war seemed possible. To avert this danger, however, and to obtain a basis for a uniform policy of abstention from interference in the region by both England and the United States with a view to securing the neutrality of the proposed canal, the Clayton-Bulwer Treaty of 1850 was concluded between the two countries, by which it was agreed that neither party would occupy, fortify, colonize, or exercise dominion over the Mosquito Coast or any part of Central America. By a treaty of Nov. 28, 1859, with Honduras, Great Britain ceded to that Republic its claim to the protectorate hitherto exercised over the Mosquito Indians and agreed to recognize as belonging to and under the sovereignty of Honduras all territory occupied by the said Indians. This arrangement was very unsatisfactory to the Indians and led to a revolt among them. The difficulty was finally adjusted by the Treaty of Managua between Great Britain and Nicaragua of Jan. 28, 1860, by which it was stipulated that Great Britain would recognize the sovereignty of

Nicaragua over the Mosquito territory lying within its bounds; that a certain district should be assigned to the Indians; and that the British protectorate should cease within three months after the exchange of ratification. A dispute having arisen between Nicaragua and the Mosquito nation in regard to the interpretation of the treaty, the Emperor of Austria was requested to decide upon the true meaning of the clauses in dispute, which he did in 1880, holding that the sovereignty of Nicaragua over the Indians was limited by the right of self-government conceded to them by the treaty. From that time onward the natives enjoyed almost complete self-government. By an agreement entered into between Nicaragua and the Mosquito Indians in 1894 they were formally and voluntarily incorporated into the Republic of Nicaragua, their country becoming the Department of Zelaya. This led to difficulties with Great Britain, which were adjusted by a treaty ratified in 1906 in which the sovereignty of Nicaragua was recognized. Pop. (est.), 15,000. Consult Travis, *Clayton-Bulwer Treaty* (Ann Arbor, 1893), and C. N. Bell, *Tangweera: Life and Adventures among Gentle Savages* (London, 1899).

MOSQUITO HAWK. The name of several animals which dart about after small flying insects, as (1) a nightjar or nighthawk; (2) a dragon fly (q.v.).

MOSQUITO LAGOON, or INDIAN RIVER NORTH. A salt-water lagoon on the eastern coast of Florida (Map: Florida, F 3). It lies eastward of the northern end of Indian River, and extends along the coast for a distance of about 17 miles. It is shallow (from 1 to 10 feet deep), has an average width of about 2 miles, and is connected with Indian River by the Haulover Canal and with Hillsborough River (to the northward) by several shallow and narrow channels, through which boats of not more than 3 feet draught may pass by Indian River to Mosquito Inlet and Halifax River. A strip of land from ½ mile to 5 miles wide separates the lagoon from the Atlantic Ocean.

MOSS, môss. A town of southeast Norway, situated on the east shore of the Christiania Fiord, 33 miles south of Christiania, on the railroad between the capital and Fredrikstad. It has a good harbor visited by steamers, and trades in wood and preserves. Pop., 1900, 8941; 1910, 8648. On Aug. 14, 1814, the treaty was signed at Moss by which Norway consented to a union with Sweden.

MOSS (MDutch, Dutch, OHG. *mos*, Ger. *Moos*, moss; connected with Lat. *muscus*, moss). The common name of plants belonging to the Musci (q.v.), one of the two groups of Bryophytes (q.v.).

MOSS, FLOWERING. See PYXIE.

MOSS, SIR CHARLES (1840–1912). A Canadian jurist, brother of Thomas Moss. He was born at Cobourg, was educated at the Ontario Law School, and was called to the bar in 1869. He was lecturer and examiner to the Ontario Law Society (1872–79), a bencher of that society (1880–97), and vice chancellor of Toronto University (1900–06). In 1894 he was an unsuccessful Liberal candidate for the Ontario Legislature. In 1901 he was made a member of the royal commission for the revision of the Imperial statutes affecting Canada. He was appointed a judge of the Court of Appeal (1897) and was Chief Justice of Ontario in 1902–12.

MOSS, FRANK (1860–1920). An American lawyer, born at Cold Spring, N. Y. He studied at the College of the City of New York and became a member of the law firm of Moss, Laimbeer, Marcus, and Wels. He was president of the board of police of New York in 1897, and served as assistant counsel to the Lexow Investigating Committee and as chief counsel to the Mazet Investigating Committee in 1899. He became professor of medical jurisprudence at the New York College and Hospital for Women and president of the New York Ophthalmic Hospital. While assistant district attorney of New York (1910–14) he figured prominently in the prosecution of Lieut. Charles Becker for the murder of Herman Rosenthal. Moss is author of a history of New York, *The American Metropolis* (3 vols., 1897).

MOSS, RICHARD WADDY (1850–). An English Wesleyan Methodist clergyman, born at Shirley, near Southampton. He was educated at the New Kingswood School, entered the ministry in 1869, and was elected a member of the Legal Hundred in 1899. From 1888 to 1902 he was classical and mathematical tutor in Didsbury College, then tutor in systematic theology, and after 1913 principal. He represented his church as fraternal delegate to the General Conference of the Methodist Episcopal church in 1904 and in 1915 was president of the Wesleyan Methodist Conference. Moss is the author of *From Malachi to Matthew* (1893); *The Discipline of the Soul* (1894); *The Range of Christian Experience*, the Fernley lecture for 1898; *The Scene of our Lord's Life* (1911); *The Life of W. B. Pope, Theologian and Saint* (1912).

MOSS, THOMAS (1836–81). A Canadian jurist, born in Cobourg, Ontario, and educated at Upper Canada College and at Toronto University, where he graduated in 1858 with the highest honors ever won by a student in that institution. He was called to the bar in 1861 and rapidly rose to the highest rank in his profession, especially as an equity pleader. He was made queen's counsel in 1872, and was elected in 1873, and reëlected in 1874, for West Toronto as a Liberal member of the House of Commons. In 1875 he was appointed a judge of the Court of Appeal, in 1877 Chief Justice of that court, and in 1878 Chief Justice of Ontario. Moss became a member of the Law Reform Commission (1875) and was vice chancellor of Toronto University in 1874–81. His brief career on the bench was remarkable for the learning, mental grasp, and finished style of his decisions. Failing health compelled him to seek a change of climate, and he died at Nice, France. Consult J. C. Dent, *Canadian Portrait Gallery* (Toronto, 1880), and D. B. Read, *Lives of the Judges* (Toronto, 1888).

MOSS AGATE. See MOCHA STONE.

MOSSÁMEDES, mŏs-sä′mā-dĕs. The chief town of the District of Mossámedes, Portuguese West Africa, situated on the Atlantic coast 150 miles north of the mouth of the Kunene (Map: Africa, F 6). It is a well-built and regularly laid out town, with a fine government building, church, hospital, and a fort. It is the terminus of a railroad which runs for 125 miles into the interior. The harbor is excellent and equipped with an iron pier, and the trade is considerable. The chief exports are rubber, cattle, and dried fish. Pop., 4500.

MOSS ANIMALS. See POLYZOA.

MOSS′BUNK′ER (from Dutch *marsbanker*,

probably from *mars*, peddler's pack, or possibly from *mas*, crowd + *bank*, bank; so called in allusion to the appearance of the fish in shoals). A name (heard about New York and New Jersey) for the menhaden (q.v.). It is said by Goode (*Fishery Industries, Sec. I*, Washington, 1884) that the word is a relic of the early Dutch, who took it from their name for the horse mackerel of Europe, which was "marshbanker." It has survived in some localities in New Jersey in its original form, but is more usually cut down and changed to "bunker" about New York and Long Island Sound.

MOSSES, WILLIAM (1858–). An English labor leader. He was born in Newcastle-on-Tyne and worked as a pattern maker at the Elswick Engine Works until 1884. In that year he became general secretary of the United Pattern Makers Association. From 1885 on he was a delegate to the Trade Union Congress, and after 1907 was a member of the parliamentary committee. In 1905 he represented the Trade Union Congress at the Pittsburgh Convention of the American Federation of Labor. Mosses was also a member of the advisory committee of the National Insurance Act, and (after September, 1913, when it was first instituted) of the sickness claims committee of the Industrial Council.

MOSSES FROM AN OLD MANSE. A collection of tales by Nathaniel Hawthorne (1846). Many of his famous sketches are contained in it.

MOSSLEY, mŏs'lĭ. A municipal borough in Lancashire, England, on the Tame, 3 miles southeast of Oldham. Its importance dates from 1840, when there were established cotton and woolen factories and foundries. The town hall is a handsome structure. The municipality owns its markets and its gas works and maintains recreation grounds. It became a municipal borough in 1885. Pop., 1901, 13,452; 1911, 13,205.

MOSSO, mŏs'sō, ANGELO (1846–1910). An Italian physiologist. He was born at Turin, studied medicine there and at Florence, Leipzig, and Paris, and was appointed professor of pharmacology (1876) and professor of physiology (1879) at Turin. He invented various instruments to measure the pulse and experimented and wrote upon the variation in the volume of the pulse during sleēp, mental activity, or emotion. In 1900–01 he visited the United States and embodied the results of his observations in *Democrazia nella religione e nella scienza: studi sull' America* (1901). In 1882 he founded with Emery the *Archives Italiennes de Biologie*, in which journal most of his essays appeared. Among his other works are: *Die Diagnostik des Pulses* (1879); *Sulla paura* (1884); *La paura* (1891; Eng. trans. by E. Lough and F. Kiesow, *Fear*, London, 1896); *La fatica* (1891; Eng. trans. by M. A. and W. B. Drummond, *Fatigue*, New York, 1904); *La temperatura del cervello* (1894); *Fisiologia dell' uomo sulle Alpi* (1897; 3d ed., 1909); *Mens Sana in Corpore Sano* (1903); *Vita moderna degli Italiani* (1905); *Escursioni nel mediterraneo e gli scavi di Creta* (1907; 2d ed., 1910; Eng. trans., *The Palaces of Crete and their Builders*, New York, 1908); *La preistoria: origini della civilta mediterranea* (1910; Eng. trans. by M. C. Harrison, *The Dawn of Mediterranean Civilization*, New York, 1911). Mosso was also a collaborator on the *Nuovo Antologia*.

MOSS PINK. A flowering plant. See PHLOX.

MOSS POINT. A city in Jackson Co., Miss., 40 miles southwest of Mobile, Ala., on the Pascagoula and Escatawpa rivers and on the Pascagoula-Moss Point Northern Railroad (Map: Mississippi, H 9). There are extensive lumber mills and a large paper mill manufacturing wrapping paper from pine slabs. Pop., 1910, 3054.

MOSS SIDE. A manufacturing town in Lancashire, England, 1½ miles southwest of Manchester. It is provided with gas, electric lighting, and water by the Manchester corporation. The town owns its tramways and slaughterhouses, maintains a free library, and provides for technical education. Pop., 1901, 26,700; 1911, 33,100.

MOST, JOHANN JOSEPH (1846–1906). A German-American anarchist, born at Augsburg in Bavaria. He learned the trade of bookbinding and in 1863–68 traveled as an apprentice through Germany, Austria, Italy, and Switzerland. On his return to Germany he was first a Socialist writer at Mainz and afterward editor of the *Freie Presse* in Berlin. He was several times arrested and imprisoned because of the violence of his writings. From 1874 to 1878 he was a representative of Chemnitz in the Imperial Reichstag, but in the latter year, having been expelled from the Socialist organization, he went to London, where in 1879 he founded the anarchist organ *Die Freiheit*. In 1881 he was there arrested for printing editorials approving the assassination of Czar Alexander II and sentenced to 18 months' imprisonment. Upon his release he emigrated to New York, where he resumed the publication of his paper. In 1886, and again in 1887, he was imprisoned for inciting to violence. During the following years he continued to publish his paper, lectured, and wrote frequently in the interests of anarchy. After President McKinley's assassination, in 1901, he was arrested for publishing a seditious editorial in *Die Freiheit* and was sentenced to one year's imprisonment. He was sent to the New York penitentiary in June, 1902. Among Most's publications are: *Der Kleinbürger und die Socialdemokratie* (1876); *Die Lösung der socialen. Frage* (1876); *Mosts Proletarier-Liederbuch* (1875); *Why I Am a Communist* (1890); *Down with the Anarchists!* (1901), a pamphlet published in order to prove that the aims of anarchy are pacific.

MOSTAGANEM, mŏs'tà-gâ-nĕm'. A fortified seaport of western Algeria, in the Department of Oran, situated on a steep cliff 280 feet above the Mediterranean coast, 45 miles east of Oran. It has flour mills and tanneries and an active trade in wool, skins, and horses. It is connected by a branch road with the railroad from Oran to Algiers. Pop., 1901, 17,485, of commune, 18,090; 1911, 21,087, of commune, 23,166. Mostaganem, which occupies the site of a flourishing Roman city, was a large and important trade centre in the sixteenth century, but later fell into decay. It has again prospered since its capture by the French in 1833.

MOSTAR, mŏs'tär. The largest town and capital of Herzegovina (q.v.), situated on the Narenta 33 miles southwest of Serajevo, with which it is connected by rail (Map: Austria-Hungary, E 5). It has a number of modern Italian buildings, but is essentially Oriental in appearance, with numerous mosques, bazars, and Turkish shops. There are a fine Greek cathedral, a higher Gymnasium, a vintner's

MOTHS - AMERICAN

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1 SALT-MARSH CATERPILLAR MOTH — ESTIGMENE ACRÆA
2 HUMMING-BIRD MOTH - HEMARIS THYSBE
3 ARGE MOTH - APATENSIS ARGE
4 PEARL WOOD-NYMPH - EUTHISANOTIA UNIO
5 PANDORUS SPHINX - PHOLUS PANDORUS
6 TIGER MOTH - APATENSIS NAIS
7 MELON CATERPILLAR MOTH - DIAPHANIA HYALINATA
8 STRIPED FOOTMAN - HYPOPREPIA MINIATA
9 TOBACCO-BUD MOTH - CHLORIDEA VIRESCENS

ALL NATURAL SIZE

and a trade school. Tobacco and arms are the chief products. Mostar is the seat of a Roman Catholic and a Greek bishop, as well as of a mufti, and has a strong garrison. Mostar was occupied by the Montenegrin army in the European War which broke out in 1914. See WAR IN EUROPE. Pop., 1910, 16,369, including over 7000 Mohammedans.

MOS'TELLA'RIA (Lat., ghost). An entertaining comedy of a haunted house, by Plautus, which appears to have been adapted from the *Phasma* of Philemon.

MOSUL, mō-sōōl'. The capital of the Vilayet of Mosul, Asiatic Turkey, on the right bank of the Tigris, opposite the ruins of ancient Nineveh (q.v.), and 220 miles by river northwest of Bagdad (Map: Turkey in Asia, E 3). It is surrounded by walls now almost in ruins. Of the ancient buildings only the Great Mosque remains. Mosul is the seat of a Roman Catholic mission, Dominican schools, a British political agency, and French and Russian consuls. It is an important military station. Its trade, formerly much greater, is now confined to cotton, hides, wax, gallnuts, gum, and wool, all carried chiefly by caravans. The principal causes of its diminished importance were the rise of Abushehr (q.v.) as an emporium of trade and the diversion of traffic by the Suez Canal. Pop., about 75,000, chiefly Arabs, but comprising also Kurds, Turks, Armenians and others aggregating about 7000 Christians, and 1500 Jews. Mosul was an old Arabic town, taken by the Moslems in 636. It was besieged by Saladin in 1182, and was successively under Mongol, Persian, and Turkish sway until finally annexed to the Turkish Empire by Murad IV in 1638. In the twelfth century it was very important, and for a time supplied Europe with its manufactures, especially muslins, which probably got their name from this town. At present Mosul has acquired importance in the eyes of archæologists, as the sites of the principal cities of Assyria can be easily reached from its precincts.

MOSYR. See MOZYR.

MOSZKOWSKI, mōsh-kôf'skê, MORITZ (1854–). A Polish composer and pianist, born at Breslau. He studied at the Dresden Conservatory and in Berlin. At 19 years of age he made his début as a piano virtuoso, and after successful tours throughout the principal European countries settled in Berlin, in which city he subsequently made his headquarters, although after 1897 he became almost entirely identified with the musical life of Paris. The best known of his works is *Spanish Dances,* which nowhere met with greater success than in America, and which may be said to have introduced him to the world at large; he also wrote many pieces for pianoforte, chamber music, concert studies, and waltzes. Among the larger works are: *Boabdil der Maurenkönig* (1892); incidental music to Grabbe's *Don Juan und Faust* (1896); a symphonic poem, *Jeanne d'Arc;* overtures, concert suites, a concerto for violin and one for piano.

MOTAZILITES, mō-tā'zĭ-līts. See MUTAZILITES; MOHAMMEDAN SECTS.

MOTECUHZOMA. See MONTEZUMA.

MOTET' (from It. *motetto,* dim. of *motto,* word, from ML. *muttum,* word, grunt, from Lat. *muttire, mutire,* to mutter). A sacred vocal composition without instrumental accompaniment, in polyphonic style. As a rule the text of motets is Latin; but there are also motets with German, Italian, and English words. Although the *a cappella* style is the rule, it was not always followed. Especially during the first half of the seventeenth century, which witnessed the beginnings of instrumental music, it was not unusual to add a *basso continuo,* or even a number of violin parts. In some instances we find even motets for a solo voice with instrumental accompaniment. The motet must not be confounded with the *anthem* (q.v.), in which latter form *homophony* (q.v.) is always employed. The form of the motet is very old and has undergone many changes with the various styles of music. The oldest motets were constructed on a *cantus firmus* (q.v.). From the *Ars Cantus Mensurabilis* of Franko of Cologne we learn that a motet had two different texts in the alto and tenor parts. J. S. Bach, in his motets, substitutes the Protestant chorale for the *cantus firmus.* Consult Hugo Leichtentritt, *Geschichte der Motette* (Leipzig, 1908).

MOTH (AS. *mope,* Ger. *Motte,* moth; perhaps connected with Goth. *maþa,* OHG. *mado,* Ger. *Made,* AS. *maþþu, maþa,* Eng. *mad, made,* maggot, grub). An insect of an indefinable section of the Lepidoptera (q.v.), separated from butterflies by superficial features and habits. No scientific distinction exists between these two, and the terms Rhopalocera for the former and Heterocera for the moths have been abandoned in taxonomy. Moths as a rule are nocturnal, while butterflies as a rule fly by day. Moths rest in most cases with the wings horizontally disposed, while butterflies hold them erect, displaying the undersurface. The antennæ of moths are likely to be feathery in shape, while those of butterflies are threadlike, swollen towards the end into a club head. The nearest to a structural division is made by the fact that all so-called moths have a jugum, or hook and eye, by which the fore and hind wings are held together in flight, while such a structure is absent from the butterflies. (See BUTTERFLIES AND MOTHS.) All but four families of Lepidoptera, and by far the greater number of species and individuals, are moths. They are, however, less conspicuous than their relatives, on account of their generally smaller size and inconspicuous hues, but mainly because of their nocturnal habits. They are of more importance, too, in their relations with mankind than the ornamental butterflies, which do comparatively little either of harm or good beyond the delight their beauty affords. The moths, on the contrary, supply the useful product silk, on the one hand, and on the other furnish a great variety of species which, especially in the larval stage, do enormous damage to growing crops and fruit, as well as to stored grain and foodstuffs, and to a long list of materials, in both their raw and manufactured states. The accompanying colored plate represents moths of various families, and exhibits the form and style of coloration assumed. The species figured are described elsewhere. Consult: I. M. Eliot, *Caterpillars and their Moths* (New York, 1902); W. J. Holland, *Moth Book* (ib., 1903); M. C. Dickerson, *Moths and Butterflies* (Boston, 1905); W. F. Kirby, *Butterflies and Moths in Romance and Reality* (New York, 1914). See BUTTERFLIES AND MOTHS.

MOTH, BROWN-TAILED. A name given in England and New England to the European moth, *Euproctis chrysorrhœa.* The moth is white in color, with a brown tip to the abdomen. Its larva feeds on a great variety of trees, and is

gradually spreading in New England. The best remedy is to burn the larvæ cases during the winter. See INSECT, *Economic Importance of Insects.*

MOTHER ANN. A name given to Ann Lee (q.v.), the founder of the Shakers.

MOTHER BUNCH. A nickname given by Tucca to Mistress Miniver, the alewife, in Dekker's *Satiromastix* (1602). The name was applied later to makers of jokes, as in *Pasquil's Jests, Mixed with Mother Bunch's Merriments* (1604) and in *Mother Bunch's Closet Newly Broke Open* (1760).

MOTHER CAREY'S CHICKEN (possibly corrupted from Lat. *mater cara*, dear mother, in allusion to the Virgin Mary). A name familiarly given by sailors to the stormy petrel (*Thalassidroma pelagica*) and other small black-and-white species of petrel. The name Mother Carey's goose, or hen, is in like manner given to the great black petrel, or bone breaker (*Ossifraga gigantea*) of the Pacific Ocean, which is a ravenous feeder on dead whales and other animal garbage and also preys upon other sea birds. See PETREL.

MOTHER CLOVES. See CLOVES.

MOTHER GOOSE. The supposed author of the familiar nursery rhymes known as *Mother Goose's Melodies.* A baseless claim that the name originated in Boston was made on behalf of Elizabeth Goose, whose rhymes were printed by her son-in-law, Thomas Fleet, as *Songs for the Nursery; or, Mother Goose's Melodies* (Boston, 1719). The title appears to have come from France, where Queen Goosefoot, or Bertha au Grand Pied, the mother of Charlemagne, was regarded as the special patron of children, and her festival, January 2, is celebrated. The most definite source is Charles Perrault's *Contes de ma mère l'oye* (1697), containing 10 stories, seven of which are from the *Pentamerone.* It was translated by Robert Samber in 1729. *Mother Goose's Melodies* were printed in London by John Newbery in 1760. Though the title is probably of French origin, the songs are English, some belonging to the time of Shakespeare and earlier. Consult "Berta de li gran pie," in *Romania*, vols. iii, iv (Paris, 1874–75).

MOTHER GOOSE TALES. See NURSERY LORE.

MOTHER HUBBARD'S TALE, or PROSOPOPOIA. A metrical composition in couplets by Edmund Spenser (1591), abounding in satire.

MOTHER MARY OF SAINT ANGELA. See GILLESPIE, E. M.

MOTHER-OF-PEARL. The shells of the large marine bivalve mollusks *Avicula* (*Meleagrina*) *margaritifera*, *Avicula macroptera*, and *Avicula fuenta*, which also produce the precious pearls. (See PEARL.) These shells are collected in the tropical seas, chiefly on the coast of Ceylon, Manila, Cuba, Panama, the Gulf of California, and the South Sea islands. In 1865 extensive fishing grounds were found on the northwest coast of Australia. The shells from Panama are small and thick and are known in commerce as bullock shells. Those from Manila and Australia are finest in quality; they are disk-shaped and often as much as a foot in diameter. There are two varieties, the white, or silver-lipped, and the black-lipped. The mother-of-pearl or nacre of commerce is really the inner portion or lining of the shell, which the oyster secretes in successive layers of filmy thinness and marvelous smoothness of surface. Some fine mother-of-pearl is also produced in inland waters, chiefly in the rivers of China, Germany, and Russia. The shells of Mississippi River mollusks have been used extensively in the manufacture of pearl buttons. See BUTTON; PEARL OYSTER. Consult: G. F. Kunz, *Fresh-Water Pearls and Pearl Fisheries of the United States* (Washington, 1898); "Mother-of-Pearl Shell Industry," in *United States Consular Reports*, vol. lxxi (ib., 1903); W. A. Herdman, *Pearl Fisheries of Ceylon* (ib., 1905); Kunz and Stevenson, *Book of the Pearl* (New York, 1908); Maurice de Keghel, *Les perles fines, les nacres et leurs imitations* (Paris, 1913).

MOTHER OF PRESIDENTS. A name frequently given to the State of Virginia, which has furnished more presidents to the Union than any other State. The following eight were born there: George Washington, Thomas Jefferson, James Madison, James Monroe, William H. Harrison, Zachary Taylor, John Tyler, and Woodrow Wilson. See STATES, POPULAR NAMES OF.

MOTHER OF STATES. A name given to Virginia as the oldest of the 13 American Colonies and because its original territory was formed into a number of States—West Virginia, Kentucky, Ohio, Illinois, and Indiana.

MOTHER SHIPTON'S PROPHECIES. See SHIPTON, MOTHER.

MOTHER'S MARK. See NÆVUS.

MOTHERWELL, mŭth'ẽr-wẽl. A municipal and police burgh and manufacturing town in Lanarkshire, Scotland, 12 miles southeast of Glasgow (Map: Scotland, E 4). Its growth and importance are due to its iron and steel works and its neighboring collieries. Its specialties are cranes, boilers, and bridge material. It has fine municipal buildings, owns its water works, and maintains a public park, etc. Pop., 1901, 30,418; 1911, 40,380.

MOTHERWELL, WILLIAM (1797–1835). A Scottish poet, born in Glasgow and educated at Edinburgh and at Paisley. His first appearance in print was as editor of a volume of local poems (1819). His *Minstrelsy Ancient and Modern* (1827) won him the acquaintance of Scott. With Hogg, too, Motherwell was on friendly terms, and in 1835 the two prepared an edition of Burns's poems. Motherwell died of apoplexy in the same year, overcome by the strain of testifying before a parliamentary committee on Orangeism. In his *Poems, Narrative and Lyrical* (1832) he utilizes Scottish and Norse mythology and occasionally shows lyric power, as in the familiar "Jeanie Morrison," which it is said was planned at the age of 14.

MOTH FLY. Any one of the true flies of the family Psychodidæ—very small, weak flies which look like little moths and are frequently found upon windows and upon the undersurfaces of leaves. They have broad wings, rather thick antennæ, and are densely clothed with hairs, even the surface of the wings being hairy. These are the only true flies, except true mosquitoes, which have hairs or scales on the wings. In the arrangement of the wing veins these flies differ from all other Diptera and probably represent the most generalized type in this order of insects. They differ greatly in larval habits: some live in rapidly running water, others on fallen leaves in small pools, others are found in rotten potatoes, while some live in dry cow dung. The larvæ have both tracheal gills and open spiracles, so that theoretically they can

breathe both air and the oxygen of the water. The family has a wide distribution, but only about 20 species are known in the United States.

MOTH HUNTER. A bird, the nightjar (q.v.).

MOTILÓN, mō'tē-lōn' (Sp., Cut-haired). A fierce tribe of Cariban stock (q.v.), inhabiting the mountains known as the Painted Andes, about Ocaña, in northeastern Colombia. They were conquered in the early Spanish period and colonized in the lowlands under supervision of missionaries, but on the outbreak of a smallpox epidemic they were compelled to cut their hair to cool the fever and were otherwise subjected to such sanitary regimen that they rebelled and fled to the mountains. They were fugitives for half a year, but returned on the subsidence of the epidemic. On a recurrence of the epidemic some years later the Indians again fled to the mountains, where they have since remained. For nearly two centuries they have been distinguished for their aggressive and untamable hostility to the whites, so that very little is definitely known of them. See YAMEO.

MOTION. See MECHANICS.

MOTION (Lat. *motio*, from *movere*, to move, Skt. *miv*, to push). In law, an application to a court to obtain a direction, or order, in relation to some question or matter incidental or collateral to the main issues of the action. Generally, motions raise questions of both law and fact, and it often becomes a serious question whether a matter can be decided by the court on motion or whether it is of such a nature as to entitle the party against whom the relief is sought to a trial. A motion differs from a trial in that the latter is the judicial method of determining the substantive rights of the parties to an action on the main issues raised by the pleadings, whereas a motion is usually made to expedite the progress of the cause, or for summary relief preliminary to the trial of an action, and cannot be employed to bring up the entire merits of the action. It may, however, be made at any stage in legal proceedings, from a motion to strike out pleadings or to quash or dismiss an indictment, to the motion to set aside a judgment or for a new trial. A motion is regularly based on affidavits or other written statements of the facts upon which the mover relies.

Where there is a question to be decided by the court on which the parties may reasonably differ, the motion can be made only after due notice to the opposite party. Generally any person interested in the subject matter of an action is entitled to make a motion to protect his interests therein, whether or not he is party to it. See AFFIDAVIT; DECREE; JUDGMENT; TRIAL.

MOTION. In music, the progression of the various voices or parts in a composition. Two voices proceed in *contrary motion* when one ascends, the other descends; in *parallel motion* when both ascend or descend; in *oblique motion* when one remains on the same tone while the other proceeds either ascending or descending. In compositions for three or more voices all three kinds of motion may appear simultaneously. Progression of voices in *parallel* motion requires the greatest care because it is here that faulty progressions (fifths, octaves) appear. For this reason the beginner would do well to lead the soprano and bass in *contrary* motion whenever possible. For examples of the different kinds of motion, see Ex. 13, under HARMONY.

In respect to the tones of a single part a distinction is made between *conjunct* and *disjunct* motion. In the former case the notes proceed either by steps or semisteps; in the latter by intervals greater than a whole step. The following two examples from Beethoven illustrate this:

MOTION OF PROJECTILES. See PROJECTILES, MOTION OF.

MOTION PICTURES. See MOVING PICTURES.

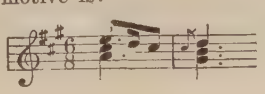
MOTIONS. A name given to a kind of puppet show, especially illustrating scriptural stories. Motions throve in England in the fifteenth century.

MOTION STUDY. The analytical observation of workers, usually craft workers at repetitive tasks, to determine the sequence of muscular movements they make. The further purpose is to establish the best and simplest sequence and by instruction make that standard for all workers at that task, thus raising their efficiency. Motion study requires both special aptitude and training on the part of the observer and the highest skill in using the stop watch. Of late the moving-picture camera, including in its field both the worker and a clock with a second hand revolving over a large dial, has been employed by Frank B. Gilbreth, to whom indeed motion study owes most of its literature and its scientific practice. It is a long step towards further refinement of the analysis undertaken in time study (q.v.) and is one of the most actively discussed of the methods advocated by the teachers of scientific management (q.v.).

MOTIVE (ML. *motivus*, moving, from *movere*, to move). In psychology, a general term for the conscious conditions of action (q.v.). As these conditions include always processes of two kinds, sensory and affective, the motive falls into two parts: the inducement, the sensory or intellectual process, the reason for action; and the incentive, the affective process which prompts to it. Thus, a thief is induced to steal by the sight of the unguarded loaf; the incentive to his theft is the unpleasant feeling of hunger. The typical motive to action is the impulse (q.v.). See ACTION.

MOTIVE. In music, the original germ from which all musical form is evolved. A motive generally fills one measure, and two motives constitute the *section*. (See FORM.) The simplest form of motive is the *rhythmic* motive considered apart from the melodic and harmonic progressions, in conjunction with which it generally occurs. Thus, the *rhythmic* motive underlying the principal subject of Beethoven's Symphony in A major is:

and the *complete* (rhythmic, melodic, harmonic combined) motive is:



However, there are also purely rhythmical motives which are set against other complete motives. A famous example is furnished in Beethoven's C minor Symphony, where the rhythmic motive of the principal subject is sounded on the basses against the secondary subject of the violins. In a wider sense the term "motive" is used almost synonymously with "theme." In the use of this term musical terminology is very careless, for "motive" more frequently is applied when "theme" or "subject" should be used. Hence, in theoretical works the term "measure motive" is adopted to denote the simplest form as explained above. The leading motives in Wagner's works should properly be called leading themes. See LEITMOTIV.

MOT'LEY, JOHN LOTHROP (1814–77). An eminent American historian, born in Dorchester, Mass., April 15, 1814. He entered Harvard College at the age of 13 and was graduated in the class of 1831. The two years following he spent in Germany at the universities of Göttingen and Berlin, and here he formed an intimate personal friendship with Bismarck which continued till his death. On his return he studied law. He was married, in 1837, to Miss Mary Benjamin, of Boston. Motley's first venture in literature was a story entitled *Morton's Hope* (1839), a very unsuccessful historical-romantic novel. In 1841 he was made Secretary of the American Legation at St. Petersburg, but, owing to the severity of the climate and his regret at being separated from his family, he soon resigned. His first work revealing his real power was a review of a memoir of Peter the Great, which he wrote for the *North American Review* in 1845. Two years later he published in the same periodical a scholarly article on Balzac and in 1849, for the same organ, a review of Talvi's *Geschichte der Colonisation von Neu England*, a paper showing accurate knowledge of the history of New England and of the Puritan movement and displaying philosophical insight. The same year saw the appearance of his *Merry-Mount*, an historical novel dealing with an episode in the early life of the Massachusetts Colony.

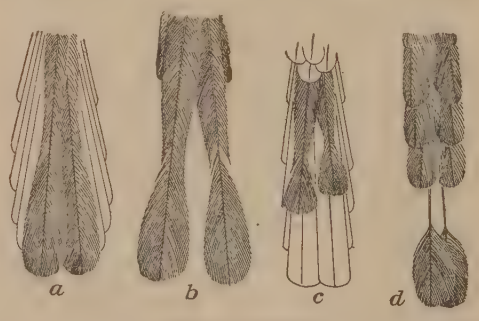
With this novel, and with an unsuccessful term in the Massachusetts Legislature, ended what may be called Motley's experimental period. He saw the true path for his genius to follow, and he was seized with the desire to write, to cite his own words, "one particular history," that of the Dutch. Having obtained the approbation of the historian W. H. Prescott, on whose territory he feared he might be trespassing, he began to gather material in America, and in 1851 he set sail for Holland to continue his researches. In 1856 appeared the *History of the Rise of the Dutch Republic*, a work in three volumes, published at his own expense. The same year Motley returned to Boston, where he remained about a year; then he went to England in 1858. Here he received the degree of D.C.L. from Oxford, and in 1860 he published the first two volumes of his *History of the United Netherlands*. In England he did his country good service by sending (1861) to the London *Times* two letters on the causes of the American Civil War, which helped to dissipate the British misunderstanding of American affairs. In 1861 he was appointed Minister to Austria, and in Vienna he served the United States faithfully and with tact, until misunderstanding and calumny caused him to resign in 1867. In 1868 appeared the last two volumes of the *History of the United Netherlands*, a book which sustained the high reputation of his earlier work and its own earlier volumes.

President Grant, on his election, appointed Motley Minister to England, but he recalled him in November of the following year (1870), for what appear to have been unsatisfactory reasons. Motley then retired to private life and began work on the last of his histories. This was *The Life and Death of John of Barneveld, Advocate of Holland; with a View of the Primary Causes and Movements of the Thirty Years' War* (1874), which, in two volumes, virtually completed his plan of the history of Holland and the Dutch. It was his last work. He had suffered an incapacitating paralytic stroke in 1873, and the death of his wife in 1874 was a heavy blow. He himself lingered three years longer and died in Dorchester, England, May 29, 1877.

Motley takes rank with the most distinguished of American historians. His work presents a finished and often brilliantly colored picture of the times and the country with which it deals. It was written only after a thorough examination and analysis of all available documents and is philosophical as well as pictorial in its treatment. It is full of an inspiring love of freedom, has the advantage of dealing with an heroic movement, displays marked skill at characterization, and often flashes with wit. His *Correspondence* is scarcely less brilliant and affords many glimpses of interesting personages, both American and European.

The histories are in print in good English and American editions. Consult: *Correspondence of John Lothrop Motley*, edited by G. W. Curtis (New York, 1889); O. W. Holmes, *John Lothrop Motley: A Memoir* (Boston, 1898); *John Lothrop Motley and his Family: Further Letters and Records*, edited by his daughter, Mrs. S. St. J. Mildmay (New York, 1910).

MOTMOT, mŏt'mŏt (onomatopoetic, in imitation of the bird's note). A bird of the family Momotidæ, related to the coraciiform bee eaters, todies, and kingfishers. The motmots are peculiar to tropical America, and only one (*Momotus cœruliceps*) of the 20-odd species reaches as far north as the Mexican boundary of the United States. They are birds of very brilliant plumage



TAILS OF MOTMOTS.

a, Lesson's motmot, central rectrices perfect; *b*, the same, rectrices denuded; *c*, Mexican motmot, central rectrices affected while yet growing; *d*, blue-headed motmot showing rackets resulting from complete denudation of a part of the feather.

and about the size of a blue jay, but more slender in form, are solitary in habits, and live on insects, reptiles, and fruits. Their most peculiar feature is the long tail, in which the

middle pair of feathers are longer than the rest and have a peculiar shape which has caused them to be called racket feathers. The cause of the peculiarity has been greatly discussed, and for years it has been supposed that the birds intentionally mutilated their plumage, biting away the vanes from the denuded part. Beebe has recently proved from observation of living birds in captivity, and from macroscopical and microscopical examination of the feather, that a median area of the vane of the central tail feathers is congenitally weak. When these feathers reach full length, shed their sheaths, and become dry, the normal preening, or passing of the feather between the mandibles of the bird, is sufficient to break off the weakened barbs, and in a short time all disappear and the racket is formed. Consult: Belt, *Naturalist in Nicaragua* (London, 1888); *Murie*, in *Ibis* (ib., 1892); G. K. Cherrie, *The Auk* (New York, 1892); C. W. Beebe, "Racket Formation in Tail-Feathers of the Motmots," in *Zoologica*, vol. i, no. 5 (ib., 1910). See Plate of KINGFISHERS, MOTMOTS, ETC.

MOTONO, mō'tō-nō, ICHIRO, BARON (1862–1918). A Japanese diplomat, born in the Ken of Saga. He graduated from the University of Lyons, France, and was made translator in the Japanese Foreign Office in 1890. He became a councilor in 1893, private secretary to the Foreign Minister in 1895, and First Secretary of the Legation at St. Petersburg in 1896. In 1898 he was appointed Minister to Belgium and in 1901 Minister to France. He became Japanese Ambassador to Russia in 1906 and in the following year was created Baron. He became also a member of the Permanent Court of Arbitration at The Hague.

MOTOORI NORINAYA, mō'tō-ō'rĭ nō'rĭ-nä'yà (1730–1801). A Japanese scholar and poet, the greatest authority, until the era of modern research, upon the customs, history, poetry, and religion of ancient Japan. He wrote many books, his most important being a commentary on the *Kojiki* (Records of Ancient Matters, the oldest extant Japanese book). The commentary is in 44 volumes. It was begun in 1764 and finished in 1796. Upon the publication of the first part students came to Motoori from all parts of Japan. In 1801 he lectured in Kyoto to crowds, princes and nobles being among his auditors. His influence increased after his death, and his writings are thought to have aided in bringing about recent changes in the Empire. He is regarded as a master of literary style and *tanka* or short poetry.

MOTOR BOAT. A generic term applied to small vessels propelled by internal-combustion motors or engines and, sometimes, by electric motors, but never to steam-driven craft. As the word "boat" has come to be used only when referring to a relatively small craft, as distinct from a vessel or ship, so the term "motor boat" is applied only to small vessels. Those over a length of approximately 65 feet are usually designated by their type, rig, or the kind of service for which they are employed—such as motor yacht, motor schooner, motor tug, or motor barge. The name is never applied to craft where the power is used as auxiliary to sails, in which case the name of the rig is used as a distinguishing appellation—as, e.g., auxiliary sloop, auxiliary schooner, and the like.

Though the internal-combustion gas motor was first put into practical operation by Dr. N. A. Otto in 1876 (credit for its conception belonging to M. Beau de Rochas), it was some years later before the principle was used for marine purposes, and it remained for others to develop it for propulsive power for boats. (See INTERNAL-COMBUSTION ENGINE.) The history of the marine gasoline engine proper may be said to date from 1885, when the first successful gasoline engine for any purpose was placed on the market, though experiments had been made along these lines both in the United States and in Europe. Until the early nineties the marine gasoline-engine industry remained almost at a standstill, but by 1893 a number of small gasoline marine engines were in successful use and several boats driven by this power were exhibited at the World's Fair in Chicago. Boats driven by electric motors run by current furnished by storage batteries were successfully operated about 1890, but made their first practical appearance at the World's Fair. These boats have usually been called electric launches, to distinguish them from boats driven by internal-combustion motors; and as the latter type developed in such a satisfactory manner, electric launches have fallen into disuse and are a negligible quantity in the field to-day.

At first one of the chief drawbacks to the use in small boats of engines built on the Otto-cycle principle was their weight, and in the efforts to produce a two-cycle motor, built on similar lines but receiving an impulse at every revolution instead of every other, thereby allowing reduction in weight, the names of Day and Nash in England and Sintz in the United States stand out prominently.

Before the internal-combustion engines were sufficiently developed for satisfactory marine use, various types of hot-vapor engines were developed to take the place of steam for power in small boats, and of these the naphtha, the alco-vapor, and the Daimler were the most successful and were placed on the market between the years 1885 and 1890. Naphtha and vapor engines differ from internal-combustion motors in that they are pressure engines, similar in general principle to steam engines, but in which the vapor of the more volatile liquids is used instead of steam. In the naphtha engines the heat for the boiler was generated by a portion of the vapor from the boiler flowing to the burner, the remainder passing to the engine and furnishing the power. The power in the alco-vapor types was furnished by the evaporation of alcohol, using gasoline as fuel. These vapor engines were vastly superior to steam for small-boat use, weighed less than a steam outfit, and were reliable. They were in great demand for pleasure-boat use up to about 1896 or 1897, and while the boats they were in were usually called naphtha or alco-vapor launches, they were in reality motor boats. As the gas engine became perfected, however, it offered so many advantages over the vapor engines that the development of the motor boat since those years has been along lines recognizing only some form of gas engine for power.

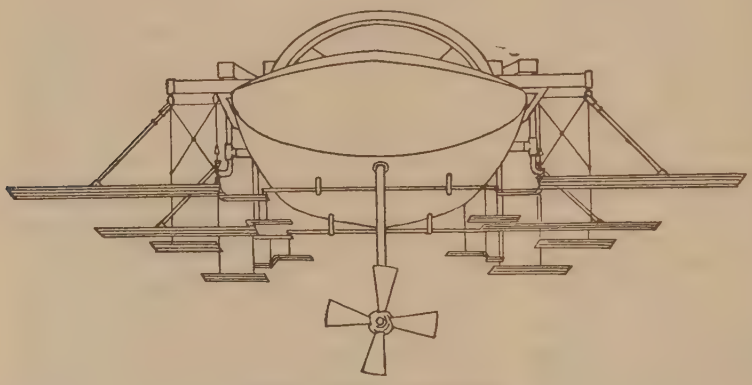
The coming of this new type of power for small-boat use brought with it a new problem in boat design. The small steam launches that up to that time had been in use had, as a rule, been evolved without much thought as to design or fitness for the work expected of them. Not much attention was given to stability, seaworthy qualities, or ease of propulsion. It was

natural when the smaller, internal-combustion engines began to make a claim for recognition for boat use that they should be tried first in the same type of craft used for steam. They were put into open boats of the steam-launch model, and at first all the efforts of builders were towards developing the *power* rather than the boats.

Under the influence of naval architecture the old hybrids of steamboat, rowboat, and steamship models were abandoned; overhanging clipper bows, cutaway underbodies, and ocean-steamship sterns in boats under 35 feet long began to disappear, and in their places came properly designed hulls, with fair curves, making them easy to drive, good sections with plenty of flare forward, proper sheer, etc. The old counterstern, which gave no bearing aft, was discarded, and in its place came the torpedo stern, the pointed or canoe stern, and lastly, the straight transom stern.

At first most of the boats that had cabins were given a high glass-windowed house that was not only unsightly, but tended to make the boat top-heavy and was not water-tight. The first departure in this direction was the adoption of the trunk cabin, borrowed from the sailboat, and the ceiled cockpit, which made a much abler boat, as it was entirely inclosed. Then came the raised deck forward, which gave more room below and produced a better proportioned hull and, if properly designed, a drier one. In the development of the cruising type of motor boat the power-boat races from New York to Bermuda, which were started in 1907, played a great part in producing an abler and more seaworthy type of craft. This race was for boats between 40 and 60 feet in length, and the best average time over the 670-mile course was 10.3 knots per hour, made by *Ailsa Craig* in 1907. Such developments as were made here found useful expression in the large numbers of submarine chasers built for the American and British navies during the World War. These were slightly larger but proved seaworthy and serviceable. There was held a race for these submarine chasers August 16–19, 1919, from Bermuda to New York that was won by Subchaser No. 131 in 56 hours and 46 minutes.

Motor boats used for pleasure can be classified under four general heads—viz., open boats, cruisers, speed boats, and hydroplanes — and each classification has been developed along separate lines. Up to about 1905 in Europe, and to 1910 in the United States, the speed-boat development followed normal lines with displacement models; but between those years the influence of the hydroplane, a boat with a series of two or more planes with steps between them for lifting the body of the boat out of the water, began to be felt. The principle of the hydroplane had been experimented with for some time, but with no very practical results, the theory being to decrease the displacement and wetted surface of the hull by lifting it above the water, as the boat ran, by means of planes, adjustable or stationary, working on the water and projecting in various ways from the hull itself. In 1876 M. de Sanderal worked out a craft in France that embodied these principles but proved a failure, and in 1897 Count de Lambert (France) built his first gliding boat that achieved any measure of success. Like his predecessors he was working with steam for power, and, as in the case of the aëroplane, no marked measure of success was obtained until the perfection of the internal-combustion motors allowed of their use, light and powerful engines being essential in boats that must lift out of the water as they run.

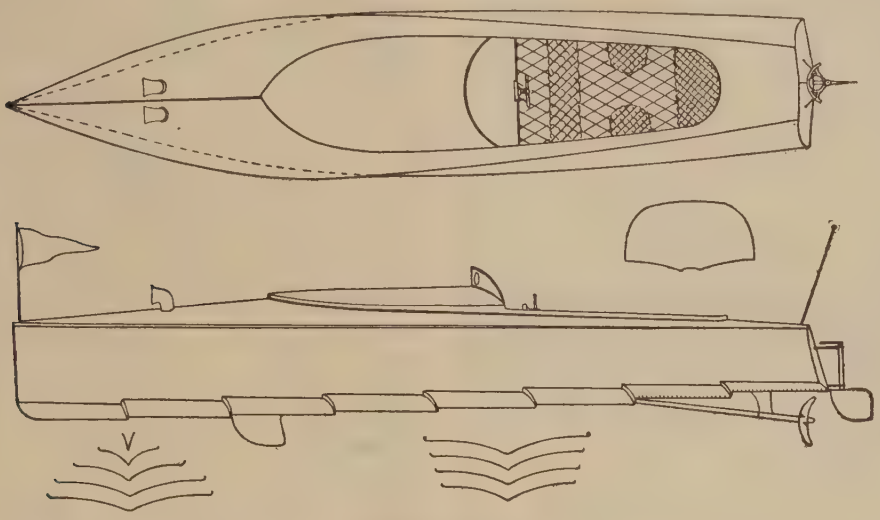


COOPER HEWITT HYDROPLANE.
Showing the series of submerged planes which lift the hull of the boat entirely clear of the water when running.

Dr. Peter Cooper Hewitt experimented with a boat in which the lifting planes were not on the bottom, but were carried by a rectangular framework around the hull, the planes themselves projecting outward several feet from this framework and below the bottom of the boat so that the hull could be lifted entirely out of the water while the planes would still be immersed. The propeller, of course, worked in the water. He obtained a speed of about 30 miles an hour with this craft, but it had the drawback of not being able to run in any but the smoothest water. Another pioneer who developed boats of this type, whose supporting planes pass through the water, was Signor Enrico Forlanini. Later W. H. Fauber, an American, conducted many tests in France of a hydroplane with a series of six or seven steps and short planes of a V section on its bottom that really marked the beginning of the present type. In this craft the accepted form of boat hull above the water was retained, and a much more seaworthy craft was produced which could still maintain very high speed. It was the remarkable speed of *Pioneer*, a Fauber hydroplane that raced in the United States in 1910 for the British International Trophy, that was largely responsible for the discarding of the displacement type of boat in America and the development of the hydroplane for high-speed purposes.

In hydroplane construction it is known that, theoretically, the lifting power increases with the size of planes, and it has been the aim of naval architects to find just the proper size and angle of planes to produce the best results.

This has led to several distinct types, each with its adherents: boats with many shallow steps, called multiplanes; boats with a single step in the middle and two planes, called biplanes; and boats with a single flat plane and



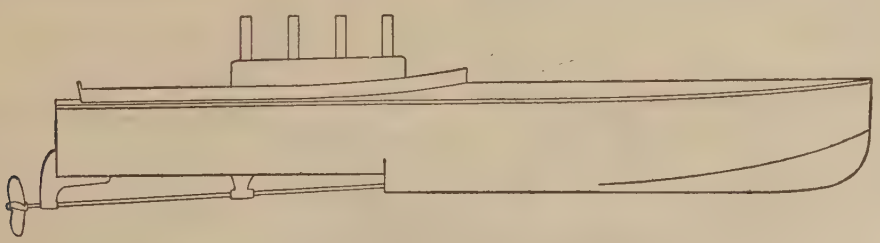
FAUBER HYDROPLANE.

Showing application of the principle to hulls of accepted design. Note the concave surfaces of planes.

no step, called monoplanes. The present tendency is towards the two latter types. Some work has been done with hydroplanes with propellers working in the air (as in an aëroplane) instead of in the water, but these have not shown as much speed or any advantage over those operating in the conventional way.

With the development of the light-weight automobile engine this type of power plane was tried in lightly built speed boats, and motorboat racing became popular. Annual regattas for boats of this type are held both in Europe and in America, those at Monaco, France, and the annual races for the Gold Challenge Cup in America and the British International Trophy being the most important though other long and short distance races are held on various rivers and lakes. The latter is an international trophy presented in 1903 by Alfred Harmsworth, later Lord Northcliffe, to encourage the development of high-speed craft under 12 meters (about 40 feet) in length. The first race for that trophy was held in 1903, when a speed of about 20 statute miles per hour was obtained. In 1907 it was captured by *Dixie I* with a speed of 31.8 statute miles per hour, owned by E. J. Schroeder and representing the Motor Boat Club of America, and remained in America until 1912, when it was taken back to England by the hydroplane *Maple Leaf IV* with a record of 43.125 statute miles per hour for a 30-mile race. In 1920 competition was resumed and *Miss America* won at Cowes, England from *Maple Leaf VI*. In 1921 the trophy was successfully defended by the United States, *Miss America II* winning from *Maple Leaf VII* which sprang a leak and sank.

By 1922 the highest racing speed obtained in the Gold Challenge Cup Race was in 1918 by *Miss Detroit III* where she averaged 57.23 statute miles an hour over a 30-mile course. The best official record for 1-mile trials, averaged with and against the current, was 80.567 miles per hour, made by *Miss America II* at Detroit Sept 6, 1921 in competition for the Lake George 1-mile Speed Boat Championship Trophy.



MODERN SINGLE-STEP HYDROPLANE OR BIPLANE.

Such as *Baby Speed Demon II* (American.)

In the commercial field the coming of the motor boat has revolutionized many industries. In fishing, lobstering, oyster dredging, and in small freight, passenger, and tug boats, the internal-combustion engine now is almost the only recognized power. It gives a power that is reliable, economical, and that greatly increases the radius of operation of the fisherman, while it allows him to make his market with a certainty unknown under sails. In the oystering industry the hoisting machinery for the dredges is also operated by this power instead of by hand. Even in the deep-sea fisheries the gas motor is used as auxiliary power up to 150 or 200 horse

power, both to enable the boats to follow the fish and to market their catch without having to wait on the wind.

Apart from the fitness of this type of power for small craft, and the fact that the motors occupy little room and can be placed in almost any desired part of the boat, another cause for its popularity is that no licensed engineer is required for its operation. With the steam plants, no matter in how small a boat they were installed, a licensed engineer was required by the United States laws, but in motor boats no licensed engineer is necessary. The United States laws governing the inspection and operation of vessels on United States waters define a motor boat as "every vessel propelled by machinery and not more than 65 feet in length, except tugboats and towboats propelled by steam."

The government regulates the equipment of motor boats (both navigating and life-saving), but does not require licensed operators or navigators, except where a boat is used to carry passengers for hire, in which case a licensed operator is required, though no examination is necessary for obtaining such license.

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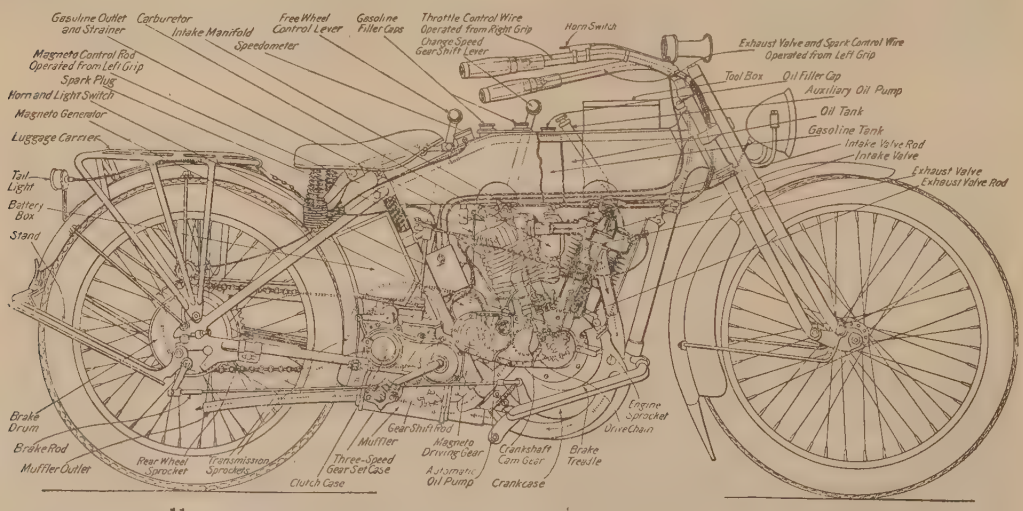
MOTOR CAR. See MOTOR VEHICLE.

MOTOR COAL CUTTER. See COAL, and Plate of COAL.

of the bicycle rider. (See INTERNAL-COMBUSTION ENGINE; MOTOR VEHICLE.) The operator rides astride of the frame of the machine, his feet resting upon special foot rests. The earlier designs had one cylinder; later and more powerful machines were fitted with twin cylinders, and four cylinders have been installed on larger, heavier designs. The motor axle is the treadle shaft of the foot-driven machine, and power is conveyed to the rear or driven wheel by chain, belt, or shaft drive. Some of the newer and more flexible machines are fitted with a variable-speed gear, or transmission gear box, so that there may be two or more speeds for the driving wheel with their increased leverage for hill climbing and for convenient manipulation in traffic of crowded streets. The motor cycle has all the elements of operation and control which belong to the motor-driven four-wheeled vehicle —tank for fuel, tank for oil, carburetor, throttle, spark-advance control, clutch, magneto, spark plugs, muffler—but is of necessity always air-cooled. The front wheel is the steering wheel.

This vehicle is much used in the control of street traffic in cities and on highways, and in military dispatch work, by reason of its possible speed and manœuvring power. Its light weight, ease of storage and upkeep, and its lower purchase price have made it popular for trips and touring without much bulk of luggage. The rider cannot be protected effectively from mud or dust or weather and must usually be dressed in conformity with these limitations. The motor will usually be started by a few strokes of the foot pedals or by a run of a few feet on the ground with the clutch engaged. As the motor cycle is developed to carry more than one person, it may become a tandem motor cycle; or a side car may be added (see SIDE CAR), which makes it a tricycle in effect; or it may pass into a four-wheeled vehicle and become a cycle car (q.v.). The thirteenth United States census for manufactures (1913) reported the output of motor cycles in 1909 as 18,628,



11-H. P. TWIN-CYLINDER MOTOR CYCLE WITH COMPLETE ELECTRICAL EQUIPMENT.

MOTOR CYCLE. A form of the bicycle or two-wheeled apparatus for transportation, with the wheels in the same plane, in which the power is derived from an internal-combustion motor which replaces the weight and muscular effort

value $3,015,988, compared with 160, value $33,674, in 1899. The exports of motor cycles in 1914 were 6410, value $1,234,194.

MOTOR GENERATOR. See DYNAMO-ELECTRIC MACHINERY.

MOTOR ORGAN (Lat. *motor*, one who moves, from *movere*, to move). A structure which when stimulated moves the parts attached. Motor organs are found at the base of leaves and leaflets in various plants, particularly members of the bean family (Leguminosæ). They are formed by the modification of the structure of the main leafstalk and of the stalks of the leaflets (Fig. 1). When the latter

FIG. 1. MOTOR ORGANS OF LEAF OF BEAN.

The primary organ at the base of main petiole; secondary ones at the base of each leaflet; the lower figures show the curvature of these organs after stimulation (blades cut away to show more clearly).

are short the motor organ may constitute the whole stalk. The motor organ is a cushion (pulvinus) of very thin-walled tissue (parenchyma) whose centre is occupied by a strand of vascular and mechanical tissue (Fig. 2). This is in sharp contrast with the structure of the stalk elsewhere. There the outer parenchyma forms the usual cortex, the vascular and mechanical strands are distinct and often numerous, and the centre is occupied by a pith (parenchyma) of considerable volume. The central position of the strands in the motor organ obviously permits freer bending. The cells of the parenchyma are normally turgid, and by mutual pressure the organ is kept rigid, supporting the leaf or the leaflet. The action of an appropriate stimulus on the plant results in the exudation of water from the cells on one side of the pulvinus. This water passes into the intercellular spaces of the organ and the cells of course lose their turgor. Owing to the now unopposed pressure of the still turgid cells on one side of the organ, it bends more or less, the flaccid side becoming concave, and the leaf blade is carried through a considerable arc. In the sensitive plants (*Mimosa*) of the tropics contact is the usual stimulus. The whole reaction takes place very rapidly, the time from shock to response being only a fraction of a second. In other plants variations in the intensity of light cause similar but slow curvatures in the motor organs. Later work on the physiology of the action of these organs indicates that the movement is brought about by a change in the permeability of the cells of the pulvinus to solutes contained within the cells. With an increase in permeability there is an exudation

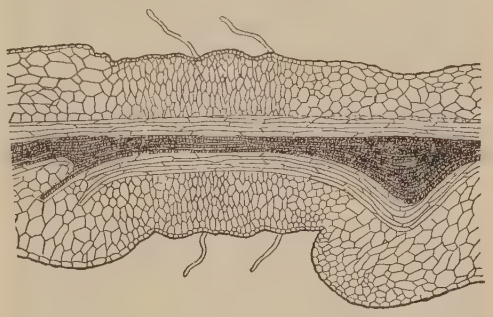


FIG. 2. LONGITUDINAL SECTION THROUGH MOTOR ORGAN OF SENSITIVE PLANT (*Mimosa pudica*).

of solution into the intracellular spaces and a shrinkage of that region of the organ. A decrease in permeability acts in the opposite way. Some stimuli (photonastic, thermonastic, anæsthetics) increase or decrease the permeability of the cells on both the upper and lower halves in the same direction, but in a different degree; others (phototropic and thermotropic) modify the permeability in one-half of the pulvinus only; and still others (geotropism) modify the permeability oppositely in the two halves of the organ. It is possible also that condensations and hydrolysis of cell substances and even changes in water-absorbing capacity by wall and protoplasmic colloids are involved in these reactions. See MOVEMENT.

MOTOR TRUCK. See MOTOR VEHICLE.

MOTOR VAN. See MOTOR VEHICLE.

MOTOR VEHICLE (Ger. *Motor-wagen*). A carriage for the transportation of passengers or a truck for transportation of freight, fitted to run on streets and highways without a track, and having the force to propel it generated within its body, or on its frame, or stored within it, so as to be operated without horses or other sources of tractive force outside of itself and transmitted thereto. The emphasis should be laid primarily on the principle of the generation of power or the release of stored energy within itself, and secondarily upon its freedom to operate for this reason on any road without a permanent track or a connection by wire or otherwise to a central power-generating station.

An historic study of the motor vehicle has been made under the article Automobile (q.v.). It may be studied from its practical or industrial aspects from several points of view:

I. Its uses and the exterior forms which such uses impose.

II. The motive power used to secure propulsion.

III. The running gear, frame, springs, and wheels.

I. The uses to which a car is to be put and the purposes which it is to serve condition its design as a structure and as a machine. These determine first of all the weight to be borne and the speed at which it is to be moved. These fix the frame, the springs, the motor and its gearing, and the design of the body, and are therefore of primary consequence. Motor vehicles may be divided as respects their uses and function into two groups:

1. Passenger vehicles; often called cars.
2. Freight vehicles; often called trucks.

A subordinate grouping of passenger vehicles may be into pleasure vehicles and business or commercial vehicles, the latter operated for hire or as productive investments.

The passenger vehicle for pleasure was the first to appear, the freight-carrying vehicle coming as a later development. The body or passenger-carrying part was based on the single-seated buggy or runabout. This provided for the driver and one passenger and carried the motor and its mechanism under the single seat. The surrey or stanhope carrying four was the next step, and from this four-passenger type were developed the designs of touring car which shortly became standard. The French recognized at once the inconvenience of access for repair and adjustment which resulted from having the motor under the body, and they placed it in front of what was formerly the dashboard of the horse-drawn vehicle. The dash was no longer needed to keep mud and splashings from the occupants of the front seat; but a partition has remained to occupy its place and keep the motor and its heat and oil confined in front of it.

The military engineer of France has called the stationary part of the mounting of a fortress gun by the term "chassis." It means the foundation for all the structure and the mechanism which are needed to train the carriage and elevate the piece—in general, the basis of all movable parts for control and manipulation. So the designer of motor vehicles calls the frame and springs, the wheels and motor and transmission of power to the wheels, taken together, by the name *chassis*. The rest of the structure of the car he calls *body*. Evidently one design of chassis can be used for many varying forms of body.

Confining attention for the moment to the types of body, the preëxisting surrey or carryall of the horse vehicle carried four persons, or three besides the driver, and had no sides. It often had no doors of entry to the rear seats and never had any for the front seats. The speed of the motor vehicle made protection from weather and dust and the safety of the rear passengers imperative, while any added weight of body could be met by increasing the sizes of the springs and the motor. Hence the rear of the body received a shape derivable from a cup or bowl or tankard, and the French, catching the resemblance of such rear body to an ornamental barrel in which the passengers sat, called this rear portion the *tonneau*, or hogshead. The name remained long after the bulging curves and exaggerated molding disappeared. The most curvilinear and ornate kind of tonneau was called the King of the Belgians model, from a specially luxurious car designed for the late King Leopold. With the displacement of molded wood for bodies by the sheet-metal body of aluminium or steel, a severer and more artistic modeling came into use, following what in the design of ships has been called stream lines.

The *touring-car* body can carry two on the front seat and three on the rear. By lengthening the rear body two additional seats can be introduced, either permanent constructions or arranged to fold and be put out of the way. Early tonneaus opened in the back; later side doors became practically universal. The touring car is therefore called a five or seven passenger car.

As originally constructed the touring car had no shelter to protect its users from the weather. The increased use in all weathers, in extreme heat and in cold, has brought about the use of what is called a top. Its presence introduces some new types of body with their names. When the body becomes completely inclosed in a permanent construction behind the front seat, with glass in windows on rear and sides and roof over the driver's seat, and for three or five passengers within it, the car becomes a *limousine*. Later designs included also the driver and the front seat in the permanent side inclosure as well as under the roof. The name is French and is that of the district from which it first came. If the top be so constructed that its rear portion can be lowered, leaving the more permanent front portion in place, the model becomes a *berliet*. The *brougham* or *taxicab* model is often made in the berliet type, but without having the roof cover the driver. Canopy tops supported upon rod posts had a temporary vogue, but have been superseded by the *cape top*, a derivative of the buggy or barouche top, supported upon bows or frames, so that it can be completely lowered at the back of the body. The cape top requires side curtains to inclose the seats completely. A glass or other wind shield is the usual equipment over the dash, to protect those on the front seat, while yet giving the driver uninterrupted view ahead.

The touring car is above all the type of pleasure vehicle for the lover of road travel in the open country. It will carry a moderate amount of luggage, its light weight makes easy-riding springs possible, and it accommodates a large family or party of guests. The limousine is the car of luxury and for use in well-paved cities. It protects the passengers from the weather, wind, and dust, and can therefore be used by wearers of expensive gowns or persons in evening dress. The size and weight make the limousine ill-adapted for rough roads, and it should not be operated at speed. In use as a town car with driver and second man, the limousine puts both employees outside of the inclosed body. In the touring car or the single seated roadster the mechanic may have a seat on the running board if the owner drives.

The first touring-car and limousine bodies were made without doors to the forebody, in which was the front seat. The standard is to have fore doors so that the driver and the other at his side may be protected from weather and dust. An effort to reduce weight and cost for the rear body resulted in the so-called *toy tonneau*, seating two, in which the height of back and sides was reduced, and usually the side door omitted. This did not win general acceptance, as the doors contribute greatly to safety and the high back and sides to comfort and cleanliness.

The fine coach work on the tonneau surface

was costly; the weight was hard on tires and increased the fuel cost; entertainment of guests on tour was expensive to the host; and the big car was more costly to make and to buy than one which would carry only two persons. Hence occurred a reversion to the earlier type derived from the buggy, a type which is called the *roadster*. It is a touring car built for two and has a single seat and usually a folding or small cape top. Behind the seat are the tanks for gasoline and lubricating oil, or a box for luggage and spare parts. Trade names of *cruiser*, *tourabout* or *raceabout* were created by some manufacturers, but they did not meet with favor. The roadster or a single-seat enclosed car or coupe has commended itself where the owner is his own driver. A difficulty of the type in some forms has been that the removal of the rear seat has unduly reduced the weight on the hind wheels for traction, so that in snow or on hills the driving wheels have not held to the road surface in a satisfactory degree. The car body vibrates with the roughnesses of the roads, owing to the lessened mass and weight. Many owners who desire to use the motor vehicle in their business have chosen the roadster and utilized the space at the rear of the seat and over the wheels to carry merchandise. It is possible to mount any desired form of body up to the capacity of the chassis and such types as the station wagon are largely used.

The roadster develops into the *racing car* or *racer* by emphasizing its adaptedness for speed. The carrying capacity is limited to that of the driver and his mechanic. The centre of gravity is made as low as possible, to secure safety at turns, the motor capacity increased, and the transmission gear receives a high ratio to compel the car to move a greater distance for each revolution of the motor. Very low seats are noticeable features of this design, compelling the legs to assume a nearly horizontal position. Fuel and oil tanks are always at the rear, behind the seats.

The first motor vehicles were driven always by their owners for pleasure and sport, and there were no paid employees to act as drivers. This fact gives an interesting side light on the origin and meaning of the term "chauffeur," now so generally applied to a salaried employee who drives the car for an owner. The first introduction of the motor-propelled vehicle among the bicyclists of France was received with abuse and contumely. "Such a man is no sport," said the users of muscles; "he is nothing but a boiler tender. Out upon him!" Now, the French term for a boiler tender is "chauffeur," and such owner of a lazy temperament who preferred a mechanical motor to his legs was a chauffeur, a term of derision. On the footplate or in the cab of a locomotive the driver of the engine is the chief and is called the mechanician. The boiler tender, or chauffeur, is his assistant. Hence when the owner drove his car his employed subordinate was in the relation of chauffeur to the mechanician as respects his employer; and the practice of having the employee drive for the owner resulted in the use of the term for the salaried driver, who is properly also the mechanic in most cases. In racing, the second man is never called a chauffeur, but always a mechanic or mechanician.

If the roadster be still further reduced in capacity, weight, and cost, so as to provide for the operator only, it becomes a *motor bicycle* or *motor cycle* (q.v.). But the developments of the motor cycle where the roads are good has resulted in the attachment of a *side car* for a passenger, and the further design of a *voiturette*, or *voiture-legère*, in France, in which the tricycle or three-wheeled motor cycle has grown into a light four-wheeled vehicle built on motor-cycle lines, but with motor-vehicle features. (See CYCLE CAR.) These approach roadsters as they increase in size, power, and weight. They have a narrow gauge and a motor of small size. The development of the limousine or touring car to secure passenger-carrying capacity for more than six besides the driver has resulted both in the *wagonette*, which is a short omnibus with seats on the sides of the inclosed body so that the occupants face each other, and the *motor omnibus* with passenger seats on the roof. This is not comfortable for road riding at speed nor for sight-seeing. Hence the *motor diligence* or *sight-seeing* vehicle has been produced, where a number of seats are arranged across the vehicle, the occupants all facing to the front. For sight-seeing each seat is slightly elevated above that in front of it; and a canopy top can be spread in case of bad weather. These latter of course are business or commercial vehicles.

A design of *motor buggy* has had some vogue where mud is deep or snow lies heavily. It preserves the large wheel diameter of the horse-drawn prototype and puts the motor under the body. Its object is to meet the requirements of deeply rutted highways where great clearance between the ruts is required. The large wheels require heavy reduction in the transmission mechanism and make a structure which it is hard to make strong enough to withstand the shock of a high speed. The light, long-spoke wheel is of necessity also a steel-tired wheel, and this fact keeps speed down. The motor buggy has disappeared therefore in many districts, and will disappear more completely with the era of good roads.

MOTOR TRUCKS

The freight-carrying class is known as *commercial vehicles*, *motor trucks*, *motor vans*, and by special names resulting from their functions. The special features are capacity for heavy loads and the provisions for loading and unloading. The earliest forms were the delivery wagon, adapted to carry light freight or bundles from store to buyers. These were special or horse-wagon bodies placed on a touring-car chassis. Later the larger and heavier types were designed, with special chassis, wheels and springs, and specially designed motor. For delivery work from department stores a duplicate body has been found a measure of economy, so that one body can be loaded at the store while the other carried on the chassis is on the road. Dumping bodies for coal and building materials can be operated from the motor. The wheels and springs require to be of special strength by reason of the heavy load, and for this same reason the speed will not be high, and extra heavy gearing is made necessary. The body designs range from the ordinary stake equipment of the dray up through the heavy express-wagon body to the special steel bodies for coal and similar material. A type of commercial wagon for stone and building material has six wheels. The rear pair are those of the

ordinary contractor's wagon, but in front of these is a special forebody, carrying the motor, steering gear, and driver's seat, and coupled to the front axle of the cart at the fifth wheel. Or, again, this motor part may have one wheel only, which may be both the traction and the steering wheel. Both designs have been accepted also as transitional designs for city fire apparatus, to transform the existing and still useful pumping machinery into motor-drawn units to increase speed and reliability. In time, however, all the motor-drawn units will depend on the internal-combustion motor for pumping as well as propulsion, and much machinery designed to this end as a single unit is now in use. See FIRE ENGINE; FIRE PROTECTION.

The motor truck or delivery wagon shows its greatest economy when it is running on the road continuously and without stops of any considerable length either in receiving its load or in its detailed delivery. In the case of delivery wagons hastening the unloading process is the great factor.

SYSTEMS OF PROPULSION

II. The second point of view from which to consider the motor vehicle is that of its mechanical propelling power. By definition above, this is to be generated either outside of the vehicle and stored within it for use, or it must be generated as required in or on the vehicle itself. There will therefore be two classes:

1. Power-storage systems.
2. Generated-power systems.

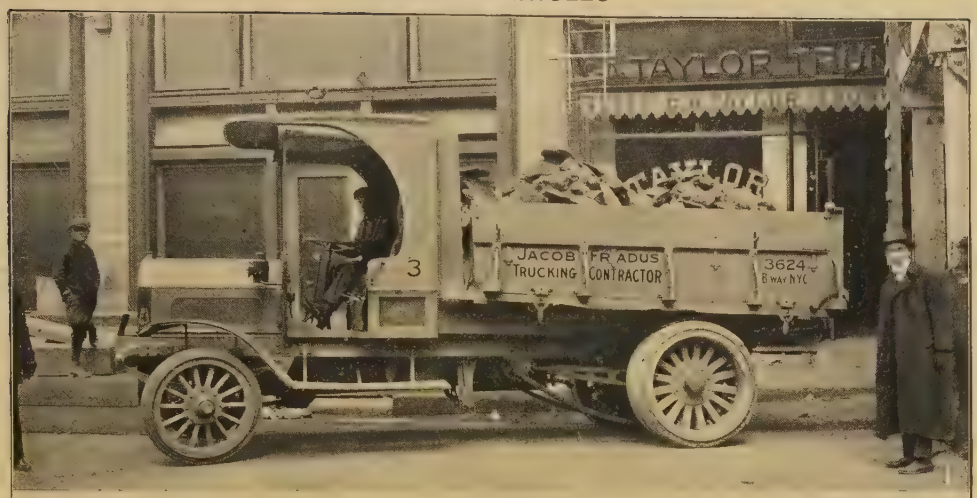
The electric vehicle is the representative of the first class; the steam-propelled and the internal-combustion or gasoline motors represent the second class.

The air of the atmosphere or any other cheap permanent gas can be compressed by a power-driven air compressor into strong steel reservoirs at a high tension and gradually be allowed to expand in an air engine down to atmospheric pressure. In this drop of its pressure it can propel the vehicle, just as steam drives a locomotive. The system has much to commend it both theoretically and practically. It is clean, simple, easily comprehended, and has no fire risk and no trouble from acids or vapors. It is not commercially practicable on the ground of expense: the radius of action of such a car is relatively small, and it is difficult to get the compressed-air tanks recharged in general touring in the country or even in many cities.

The Electric Motor Vehicle. In the electric storage system a chemical compound very ready to oxidize is reduced by passing an electrical current through it. This in effect charges the battery cell containing the compound, and when desired the process of oxidation in the battery solution gives out the electrical energy previously stored. The current need only be led by wires through the necessary switch for reversing and through a controller to an electric motor in mechanical connection by gearing to the driving wheels. In the early electric vehicles two motors were used, one for each wheel. This made differential gearing unnecessary for going around curves. The later designs had shaft drives, and gearing transmissions, so as not to draw down the battery energy too fast on hills.

The electric vehicle with a charged storage battery has a radius of action limited by the capacity of such battery. To increase the number of hours during which it will supply constant energy is to increase the number of cells and the consequent weight. The battery should be capable of being easily removed from the vehicle when nearly exhausted and replaced by one freshly charged. The batteries can be recharged wherever electrical energy is available, but there are of course many rural neighborhoods where charging is troublesome. The electric vehicle is by excellence the town car, and for paved and level streets. The ordinary battery capacity for a four-passenger electric brougham or roadster at average speed and on level or slightly rolling roads will carry it 75 miles. Heavy loading, poor road surface, heavy hill climbs, sand, mud, or snow will reduce this limit proportionately. This capacity is given by 40 cells in a lead battery of 13 plates each, or by 54 cells of the Edison design. The lead battery will weigh 1300 pounds and the nickel-iron battery about 1000 pounds. The controlling mechanism in standard designs is designed to give speeds of 5, 8, 13, 17, and 20 miles per hour. At the ordinary suburban rate of six cents per kilowatt hour for battery charging, the usual cost for charging current for a day's usage will be about $1.50.

Steam-Propelled Motor Vehicles. In the second group of types of motors for propulsion the steam-driven vehicle is historically the first. (See AUTOMOBILE.) In this system a fuel is burned under a boiler to generate steam, usually at relatively high pressure, which latter drives a reversing steam engine similar to that of the railway locomotive. The shaft of this engine is connected by reducing gears to the driving axle and its wheels. The fire box is open to the air to admit oxygen for the combustion of the fuel, and there are hot products of the combustion to be disposed of. The higher the pressure of the steam, the smaller the engine can be for a given power; hence the engine is usually compound, so as to utilize all the available energy of the steam. Steam-driven vehicles in America have been exclusively of the passenger and pleasure types, although in England steam-driven trucks have had some vogue and success. In France the best-known work with steam vehicles was done by M. Leon Serpollet. In 1889 he designed a type of flash boiler in which the water was pumped in small quantities into a coil of pipe close to the burner, where, owing to the intense heat, the water became steam with great rapidity and was then passed into a series of twisted flat tubes in the current of hot products of combustion, where it became highly superheated. The fuel used was gasoline or kerosene oil, the combustion being effected first by vaporizing the liquid and then mixing it with the necessary air in a burner on the Argand principle. The Serpollet engines were four-cylindered, either with the axis of one pair at 90 degrees with that of the other and each axis at 45 degrees with the vertical, or with the cylinders in pairs opposite to each other in a horizontal plane (double opposed). The power plant of the American steam pleasure vehicle has had two forms: in one the boiler is a fire-tube upright boiler; in the other it is a semi-flash water-tube boiler of coils of steel pipe. In the early Stanley designs the boiler had steel heads and copper fire tubes, the shell being of copper, bound closely with steel piano wire to give great strength against rupture while preserving ductility to resist sudden changes of



REPRESENTATIVE MOTOR TRUCKS

1. MACK 7½-TON CONTRACTOR'S TRUCK
2. SAURER 5-TON HYDRAULIC HOIST TRUCK
3. MACK 2-TON WORM-DRIVE DEPARTMENT STORE TRUCK

MOTOR TRACTORS

1. TRACTOR WITH SELF-STEERING APPARATUS PLOWING
2. TRACTOR HAULING WAGONS FOR ROAD CONSTRUCTION
3. TRACTOR HAULING WHEAT TO MARKET. USED ALSO FOR MILITARY TRAINS

temperature. The liquid gasoline was fed to the burner under considerable pressure. The boiler held little water at one time, and was therefore safer than if more energy had been stored in a larger mass of highly heated liquid, but great care had to be exercised to prevent the water being exhausted, as the boiler would promptly burn out by overheating at the joints. The semi-flash boiler of the White Company introduced the cool feed water at the top of the series of coils, farthest from the heat of the burner, and drew out superheated steam from the hottest coils at the bottom close to the flame. From time to time American inventors have developed steam cars that have been demonstrated with some success as to power and flexibility but they have failed to secure approval and use. Most ingenious devices were used to make the fuel supply at the burner and the water supply to the coils automatic in relation to speed of the motor and the demand for power, and when they were in good order they left nothing to be desired. The English motor trucks or vans burned either coke, coal, or liquid fuel, such as kerosene or gasoline.

The steam-propelling system had these advantages:

1. Quiet running—no gears or chains in transmission.
2. Flexible as to speed by opening or closing a throttle.
3. The engine reversed easily.
4. There was a reserve of power, stored in the high-pressure steam and water in its boiler, that made it easy to start without auxiliary apparatus.

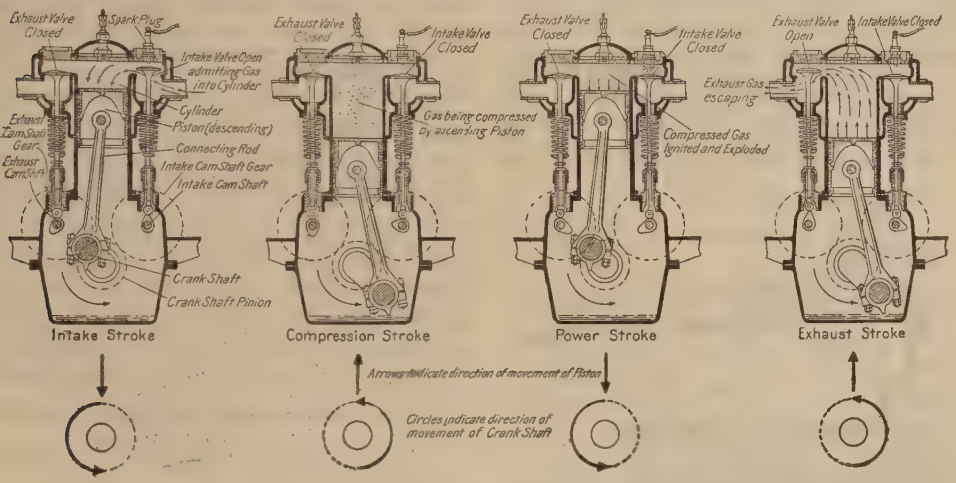
The objections to the system were:

1. The open or external flame, troublesome in high winds, dangerous as source of possible fire if the car were left alone with flame alight.
2. The pressure on the tank of fuel and the danger from a leakage under that pressure.
3. The time and delay in starting the vaporization of the liquid fuel when the car was cold.
4. The necessity for filling the water tank at comparatively short intervals of time or distance.
5. The lubricating oil which came from the engine to the condensing radiator and so into the water feed of the boiler.
6. The complication of the automatic devices and their continual need of care and upkeep.
7. The relatively high fuel consumption per mile.

Internal-Combustion System. The practical advantages of the internal-combustion principle have put it far in advance of any other steam system in the modern development of both the passenger and the freight vehicle.

The propulsive energy in this system is derived from a mixture of fuel gas or vapor with air in proper proportions to burn actively and instantaneously when ignited. This mixture is drawn into the cylinder by a suction stroke of the piston and is compressed upon the return traverse; at the instant of maximum compression (or just before) it is ignited by a spark and the ensuing combustion causes a great increase in pressure, due to the increase in the volume of the gas when hot as compared to its volume when relatively cool before firing. This pressure acts on the piston and the power stroke is communicated to the crank shaft. The final or fourth cycle is the exhaustion of the cylinder as indicated on the accompanying diagram, which shows the successive stages in such an engine. The combustion is entirely inclosed or internal to the cylinder, hence the name internal combustion. (See INTERNAL-COMBUSTION ENGINE.) If fuel gas is delivered to such an engine it is a *gas engine*. (See GAS ENGINE.) If the fuel is a liquid hydrocarbon, such as gasoline, alcohol, or kerosene, a piece of apparatus is required to atomize the liquid and make it into a mist or fog and then completely to gasify it so that it may burn instantaneously and without smoke. Such a device is called a *carburetor* and is not only both an atomizer and vaporizer, but also a mixer, supplying the quantity of fuel needed and the air for its complete combustion and increasing the proportion of air as the motor speed increases. The carburetor is therefore expected to meet the following requirements:

1. It must proportion air and fuel.
2. It must mix them intimately.
3. It must proportion and mix under wide variations of car and engine speed and corresponding variations of pressure on the delivery side of the instrument.



THE SUCCESSIVE STAGES IN A FOUR-CYCLE MOTOR-CAR ENGINE.

4. It must mix and proportion under wide variations of power demand and under inverse variations of speed with power.

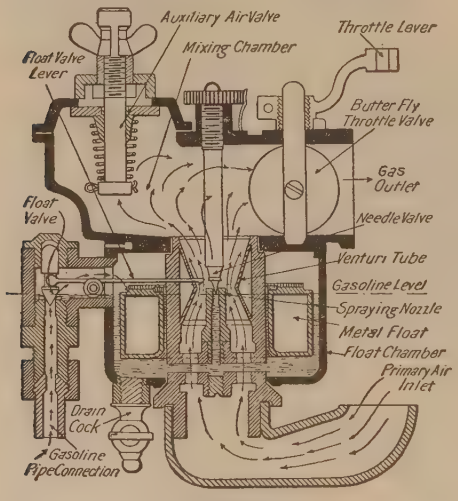
It must vaporize the liquid fuel under wide variations of temperature, and particularly for the first few strokes of the piston when the engine and carburetor are cold.

6. It must preclude flooding by excess liquid fuel, particularly after a run at speed, and above what the motor can assimilate in a few revolutions.

7. It must meet increased demand for speed promptly, and permit rapid acceleration from rest or after a slow-down.

8. It must operate successfully for the above requirements under variation in the quality and particularly of the volatility of the gasoline furnished to it.

The modern carburetor which seeks to meet these contradictory requirements has usually three inlets and one outlet, as illustrated by the type shown. The first will be the gasoline or fuel intake. This takes gasoline from a storage tank, delivered either by gravity from a level above that of the carburetor or by a pressure of air or products of combustion greater than that of the atmosphere on the surface of the fuel in such storage tank. Excess flow to the carburetor is prevented by a float in the float chamber of the carburetor, which rises when a desired level is reached and in such rise closes a needle valve in the fuel-supply pipe.



CARBURETOR.

The float-control idea was due to Maybach. The float may actuate the fuel valve directly or, more usually, through weighted levers, so that jolts and swaying of the car may not unseat the valve and flood the chamber. Inertia of float and weighted levers may be made to neutralize such fluttering of the fuel valve. From the float chamber a passage leads to the jet nozzle, whose height is $\frac{1}{16}$ inch above the level of the fuel in the float chamber. Any lowering of pressure at the nozzle will unbalance the pressure on the liquid, and the latter will flow through it into the moving current of air which surrounds it. The normal quantity of air for proportioning the mixture will enter through the second inlet orifice, usually fitted with a screen to keep dirt out. The flow of both fuel and air will be determined to a degree by the lowering of pressure around the jet, and by proportioning the areas of cross section of the jet nozzle and the fresh-air inlet the mixture is kept somewhat as desired. But under great reductions of pressure caused by high speeds of the engine the quantity of fluid flowing will increase more rapidly than the needed air, owing to its greater mass and inertia. The easiest way to meet this difficulty is by an auxiliary or supplementary air valve held shut by a spring against light suction pressures, but opening progressively to admit more air as the engine speeds up and the pressure in the mixing passage grows less. The fourth orifice is the outlet to the engine. This is usually the passage to which the throttle valve is attached and which it controls. With the throttle closed or nearly so, the reduction of pressures in the cylinders is not so completely admitted to the carburetor passages, and hence the flow of mixture to the cylinders is under less difference of pressure. The friction past the throttle also prevents the compression in the cylinders from being as effective as when mixture flows freely to fill the cylinder on the aspiration stroke. Anything foreign which gets into the carburetor jet and closes it will stop gas making and the engine will stop. The air passing to the mixing passage is often led by a pipe from a jacket around the hot exhaust pipe to preheat the air for combustion. The carburetor is usually made with hollow walls in which the jacket water is circulated. This is to keep it warm in cold weather and to keep it from getting too hot in long runs. The carburetor often requires to be helped to a rich flow of mixture in starting by "tickling" or depressing the float so as to open the fuel valve and raise the level of fuel in the float chamber so as to produce an instantaneous excess of liquid at the fuel jet. Too much liquid or too "wet" a mixture ignites with difficulty if this process is overdone.

The internal-combustion engine for the motor vehicle offers the following advantages:

1. Light weight for the power it can develop.
2. Safety from fire.
3. Simple mechanism, not likely to get out of order.
4. Speed in starting.
5. Economy in fuel, because the motor is efficient.

The objections to the system are:

1. It is only efficient at one speed; hence gearing has to be introduced to meet the condition of heavy resistances at low speeds of car.
2. It turns only one way; hence a reversing gear must be added.
3. It does not start from rest by opening a throttle valve. One working stroke or more must be made by some external force, such as the human arm, an electric motor, or the energy in compressed air; or the cylinders must be primed by letting in a mixture of fuel and air compressed outside and sent into the motor by its pressure and fired before the motor has turned over.
4. The heat of combustion makes it necessary to cool the cylinders by circulating water or currents of air. This is necessary to enable the pistons to be lubricated and to prevent irregular firing or preignitions.

Objections Nos. 1 and 2 have been met and overcome by introducing a train of toothed gears between the motor and the driving wheels.

By introducing a clutch and a train of gears of different numbers of teeth it is possible:

1. To turn the motor and not propel the car.

2. To turn the motor fast and yet move the vehicle slowly.

3. To overcome the resistances due to inertia of the body and passengers in starting from rest and yet have the motor revolve at its best speed and with no danger of stalling.

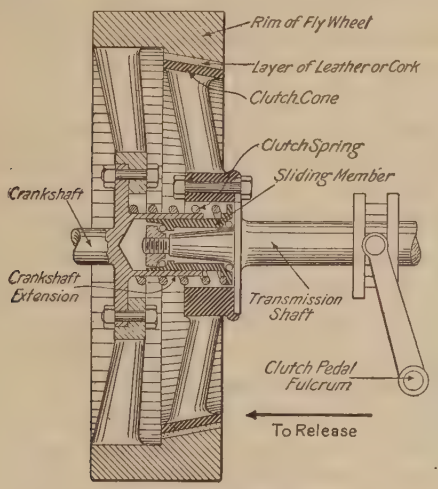
4. To make possible the use of a much smaller cylinder volume (piston area multiplied by stroke) than would be required for starting from rest if there were no gearing. When the car is in motion, the motor has to overcome much less resistance than is met in starting.

5. To start the motor independently of the wheels by inserting an engaging and disengaging clutch in the transmission. This enables changes in the gear ratio to be made without inconvenient shock, and with much less effort than if the train of gears were always under stress.

6. To enable the car to coast with motor disconnected from drivers.

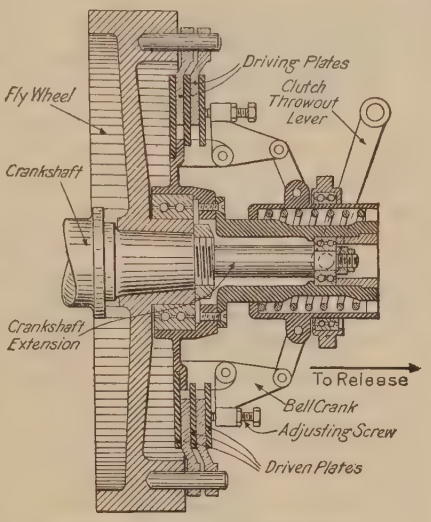
The clutch, the train of gears, and the differential gear at the rear axle may be generally called *the transmission*, because their function is to transmit the power and the motion of the motor crank shaft to the driving wheels which are in contact with the ground.

The clutch (q.v.) is a well-known mechanical device for engaging or disengaging a source of power from the machinery it is to drive. In the motor vehicle it is normally held engaged or in the driving position by a powerful spiral spring. It is disengaged so that the motor does not drive the car by compressing this spring by the action of a foot pedal (usually located so as to be operated by the left foot). Its function is to enable the motor to be started independently of the car; to have the motor disconnected from the wheels without shifting



SECTION OF TYPICAL CONE CLUTCH.

gears while coasting or in traffic stops; to enable transmission-gear ratios to be changed without having to overcome the pressures on these gears due to the magnitude of the resistances being overcome. The slipping or flexibility of the clutch permits it to save the motor and the teeth of the gears from shock when the car meets a sudden resistance, as in a collision or a hole in the road. Motor-vehicle clutches are of the friction type and usually of one or two varieties. The cone clutch has two conical contact surfaces, of which one will be pressed into the other by the spring above referred to. The hollow member (sometimes called the female part) will usually be found on the inner face of the rim of the flywheel of the engine.



SECTION OF TYPICAL DISK CLUTCH.

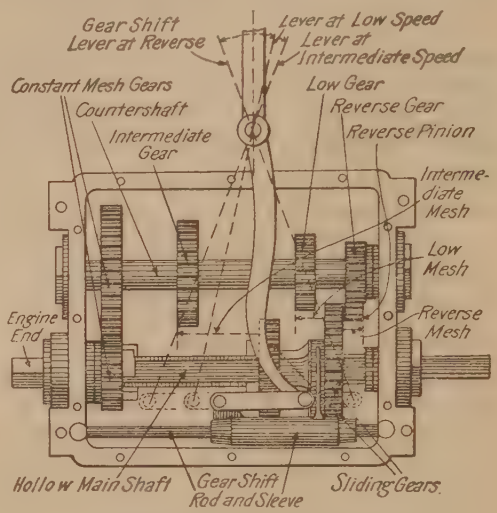
The male part can slide longitudinally on its shaft so as to go in or out of contact with the hollow or female part. The contact surfaces may be metal to metal or the face of the male element may be faced with leather. The other varieties are disk clutches, in which a series of alternating disks are borne, the odd members by the driving element of the clutch and the even members between the driving disks being attached to the shaft to be driven, so as to compel it to turn with them but capable of slight longitudinal motion thereon. The spring forces these alternate disks into contact by their faces; and by having enough of them, a sufficient contact area is secured so that one set will drive the other. The pedal movement antagonizes the spring, and the disks separate enough to disengage the driver and driven. This type of clutch was proposed by Weston. It engages more smoothly than the cone type, but is usually more sluggish in disengagement. The clutch was often interconnected to the hand brake of the car, so that if the brake was set the car could not be started. This practice was discontinued, particularly for heavy-grade work, so as to allow the motor to be used as a brake with the hand brake in series with it as an additional resistance.

The Gear Box. It is universal to inclose the train of gears for the changing of driving speed and for reversing in an oil or grease tight casing or box within which they may work free from grit and with minimum noise and complete lubrication. This gear box is a most important element in the transmission of speed and power, and is often called the transmission, of which it is properly only a part. The principle of the operation of a train of gears is that when a small diameter of gear drives a large one there is a gain of leverage

(often called power) with a loss of velocity. This is reversed when a large gear drives one of smaller diameter. For starting a car from rest the motor should turn at its usual speed or faster, while the driving wheels should turn slowly so as not to slip on the ground. Here then a small gear driven by the motor through the clutch should mesh into one of considerably larger diameter. So far as the mass of the body of the car is concerned the motor is working in *low gear*. There will usually be a second speed, faster than the low, and a third speed and a *high-speed* combination in four-cylinder cars. In six-cylinder cars there may be only three speeds, by reason of a greater flexibility of the motor on each gear. The gear box also embodies a second principle in transmission by gears; in a train of such external gears the odd members are revolving in one direction and the even members in the other. Hence by inserting a wheel between wheel number 1 and wheel number 2 so that the latter becomes number 3, the direction of rotation of the latter is reversed, and the motor driving gear number 1 will drive gear number 3 connected to the driving wheels in the reverse direction from that in which they turned when the driven gear wheel was numbered 2 in the train. The gear box is then said to provide for three (or four) speeds forward, and reverse. The gear for backing is always a slow and powerful combination. The high-speed gear is usually a *direct drive;* i.e., the change gears or back gears for gaining leverage in driving are out of mesh, and the shaft from the motor or clutch which enters the gear box is directly connected to the shaft which carries power out of the gear box to the driving wheels. Engagement or changing of gears in the gear box is effected by sliding the gears lengthwise on their axle, either squared or splined so as to allow lengthwise sliding but compel rotation of shaft and wheel. The teeth of the gear are so shaped at their ends that entry into gear is made easy and sure. The gears must not be turning at rates too different if this meshing is to be secured, and it is part of an operator's skill to make changes silently and without shock.

Planetary gearing is a type less usual than the sliding type, though employed on the well-known Ford car, in which the transmission for each speed is effected by using one externally and one internally toothed wheel in the same plane of revolution, the two being connected together by a small pinion or by several small pinions borne or revolving upon studs. The studs for these connecting gears are borne upon a plate or disk concentric with the common axis of driver or driven gear, which is free to revolve when permitted to do so. When thus free the pinions revolve around the external driving gear as the planets revolve around the sun, and transmit no power or motion, and the concentric disk revolves also. When the disk is prevented from revolving by a brake band or otherwise, the pinions must transmit motion and power, because their axes are no longer free to rotate. Hence a transmission is effected, and the teeth of the gear are always in mesh. The type is heavy and cumbrous as compared with the sliding gear, and with the use of gears of alloy steel of high abrasive and other resistance in the latter, the need for continuous meshing has disappeared.

Friction Gear.—The variable speed for varying resistances of the road has also been secured by applying what is mechanically known as the brush-wheel gear. This consists of a flat face or driving disk on the rear end of the engine shaft, against which is pressed by an adequate spring force a smooth-edged disk. The latter is covered on its contact circumference with leather or rubber or some similar slightly compressible material. The driven disk has its axis at right angles to that of the motor; and this driven disk can be pressed against the driving disk at varying radial distances from the axis of the latter. When the driven disk is



PROGRESSIVE SLIDING-GEAR SET.
Showing operation of change-speed gear-shift lever.

rotated by contact and pressure near the axis of the driving disk there is slow speed and power. When the driven disk is held and driven farther from the axis there is speed and less power. When the driven disk is moved past the centre of the driving shaft the driven disk turns in the reverse direction. By this system there is no meshing or sliding of gears; the increase or decrease of speed can be gradually made with or without limitation of steps in gear ratio; the gear-shift lever is also the clutch lever, or the clutch pedal of the other system, and is retained as a means of releasing the pressure of the disks against each other. The difficulty with the gear is that the driven disk must have a surface of some extent in contact with the driving face; and hence at only one plane of the former will the contact areas have the same linear velocity. Hence the contact material wears unevenly and the face of the driving disk wears into hollows where the driven disk runs most frequently and with the greatest contact pressure and with rings projecting between such hollows.

Shaft Drive. Chain Drive. Worm Drive.—The power and the motion coming from the motor through the gear box are to be further transmitted to the rear or driving axle of the car. This may be done in one of two ways: the driven shaft in the gear box may be extended by what is called the *propeller shaft* and by means of flexible joints of proper construction made to operate a driving pinion in gear with a toothed wheel on the driving axle, or the driving may be

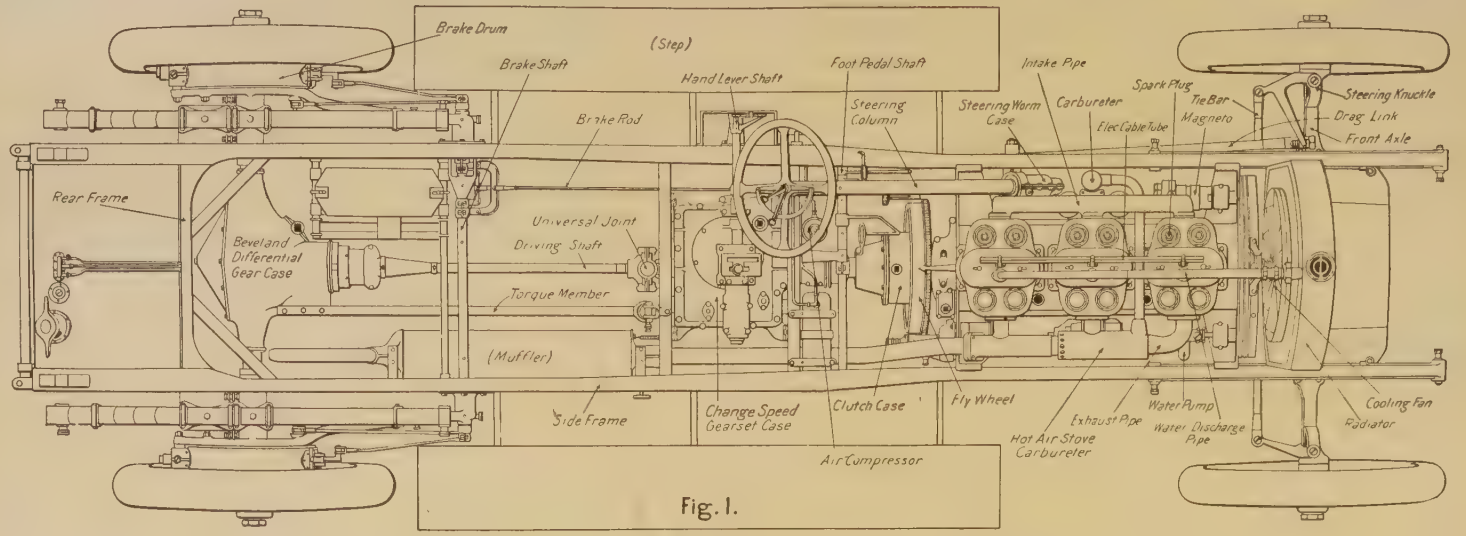


Fig. 1.

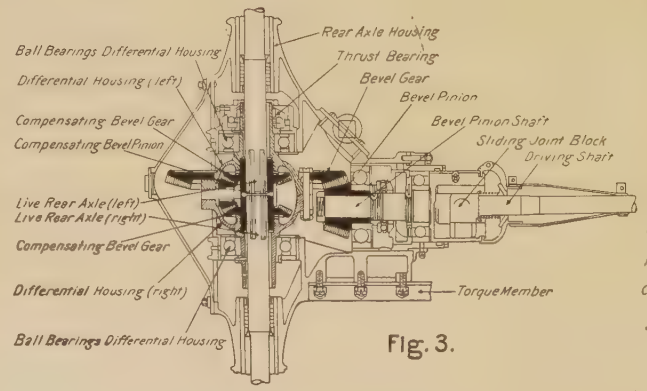


Fig. 3.

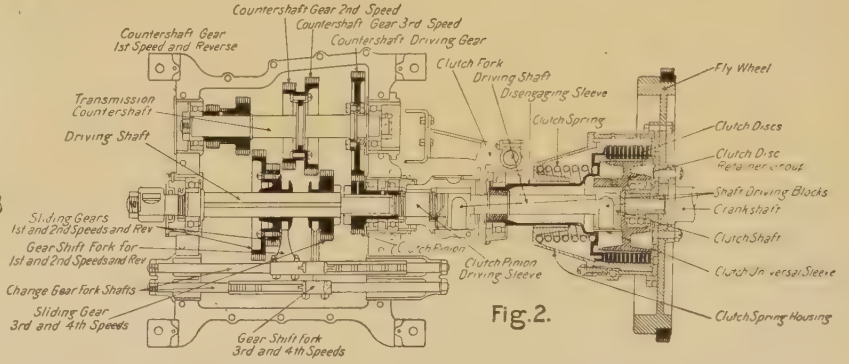
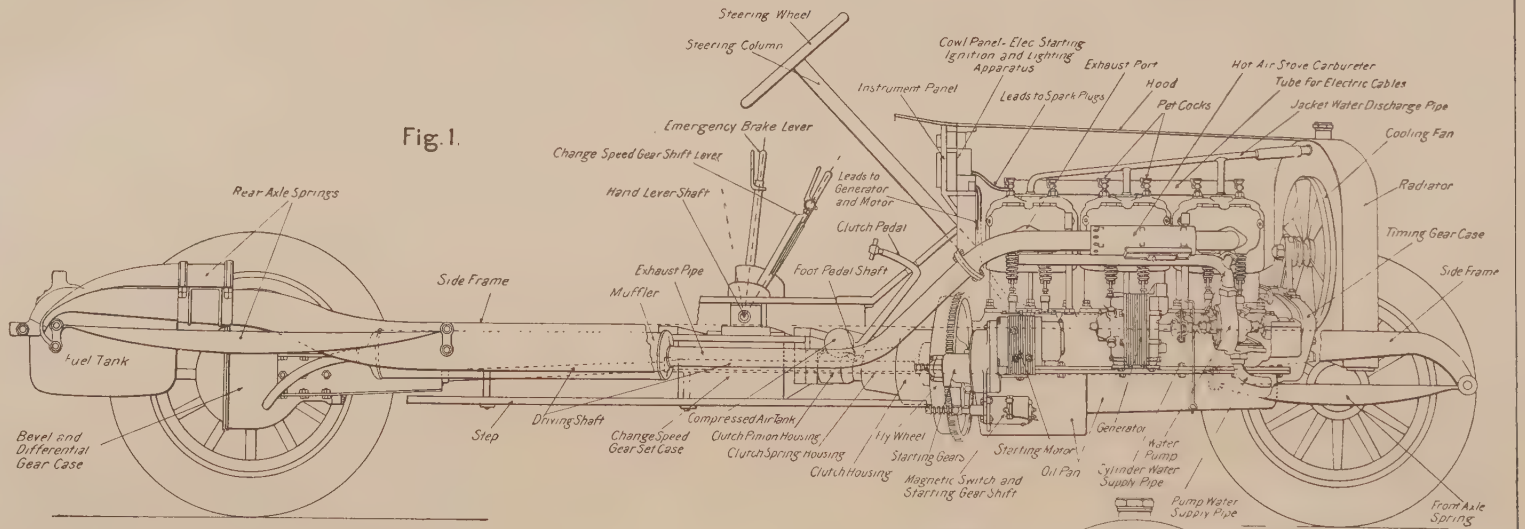
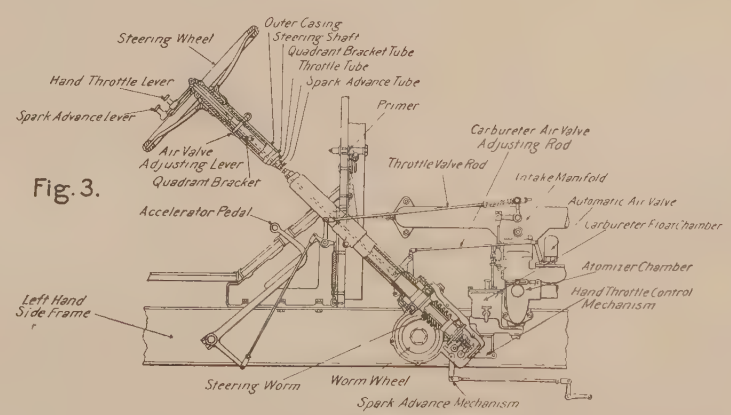


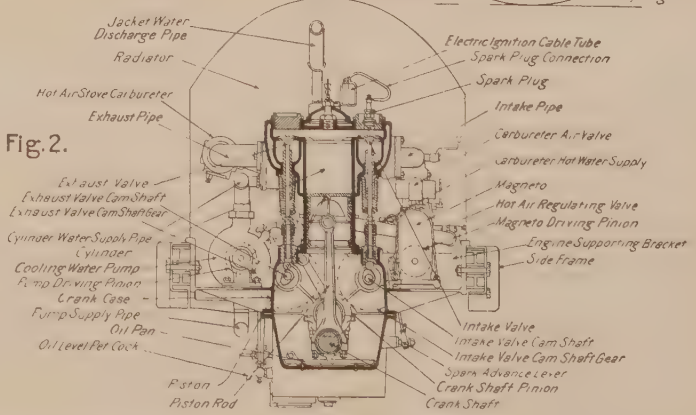
Fig. 2.

A HIGH GRADE SIX CYLINDER ENGINE AND CHASSIS

1. SIX CYLINDER ENGINE AND CHASSIS—SECTIONAL PLAN
2. MULTIPLE DISC CLUTCH AND SELECTIVE CHANGE SPEED GEAR SET
3. LIVE REAR AXLE AND BEVEL AND DIFFERENTIAL GEARS



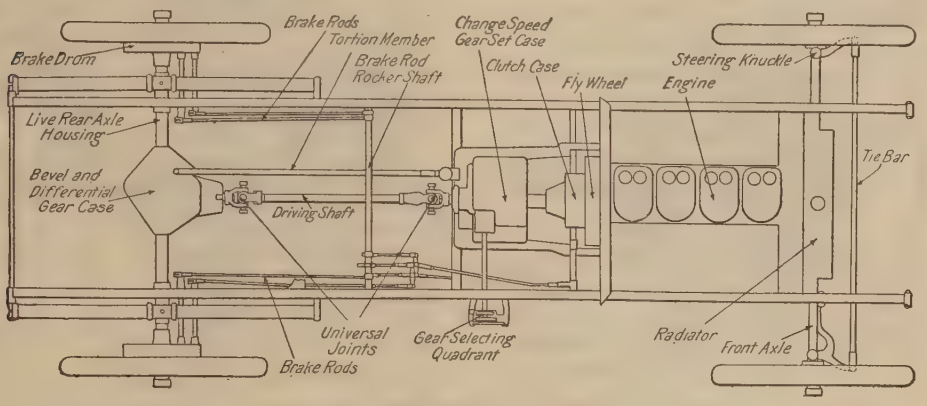




1. VIEW OF RIGHT-HAND SIDE OF CHASSIS OF TYPICAL HIGH-GRADE SIX-CYLINDER AMERICAN CAR
2. VERTICAL TRANSVERSE SECTION THROUGH ENGINE END OF CHASSIS
3. DETAIL OF STEERING COLUMN AND ACCELERATOR MECHANISM

done by chains to sprocket wheels on the wheels themselves and independent of the rear axle. The first is called the *shaft-drive* system and is much in favor for light and medium-powered cars. The second is the *chain-drive* system and is generally preferred for heavy commercial vehicles which do not use the *worm drive*. The worm gear gives compact and rapid reduction of speed and change of direction of motion, and is adapted for high rotative speed of the motor.

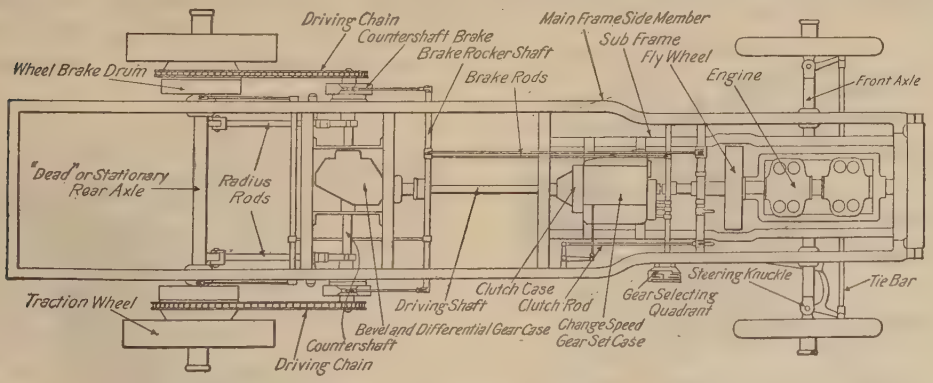
Propeller Shaft. Universal Joint. Cardan Joint.—The motor and the gear box are fastened to the frame of the car, so as to be borne upon the springs and to receive the benefit of



PLAN OF TOURING-CAR CHASSIS.
Showing shaft drive.

chain drive was the first system and offers the advantage of flexibility in yielding to distortions of the frame from inequalities in the road and obstacles met by one wheel only. The objections are the difficulties of protecting the exposed chains from mud and grit and of constructing protecting covers which shall be both effective and convenient. The shaft drive is clean, positive, mechanically simpler, and needs no troublesome lubrication. The chain drive requires a shaft parallel to the rear axle and carrying the driving sprocket wheels. This is called the jackshaft and is driven by a bevel-pinion gear in the gear box. The shaft drive has no jackshaft, and eliminates weight.

Worm Drive.—English practice in pleasure vehicles and American standards in motor-truck

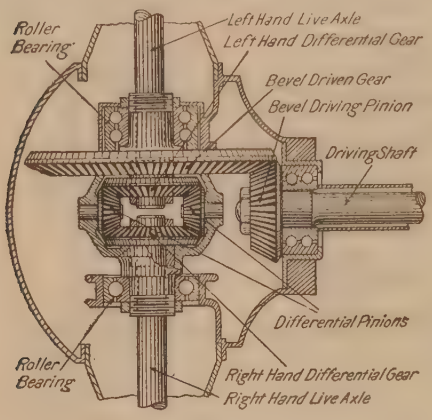


PLAN OF MOTOR-TRUCK CHASSIS.
Showing chain drive.

design make use of the screw drive or worm gear as a means of transmitting power from gear box to rear axle. (See ENDLESS SCREW.) The worm or screw is on the propeller shaft, and the end thrusts are borne by ball bearings. The worm wheel is at right angles to the propeller shaft on the axis of the rear axle. The elastic support of their weight. The jars and shocks which affect both axles and the spring-supported frame will cause different motions of both, and yet they must be connected mechanically, so that the motor may drive the axles under all loadings and vertical motions. This requires a *universal joint* at each end of the propeller shaft. This is a combination consisting of a diagonal cross-shaped piece of steel, to whose ends the driving and driven shafts are connected, each at right angles to the axis of the other. That is, if the driving shaft is connected to arms 1 and 3, the driven shaft will be connected to arms 2 and 4. Hence the angle between the centres of the driving and driven shafts can be varied within a considerable range and neither shaft be flexed by such variation when the two shafts revolve. Such universal joint is used in compass mountings, and was first proposed by an Englishman named Hooke. It is also called a "Cardan" joint.

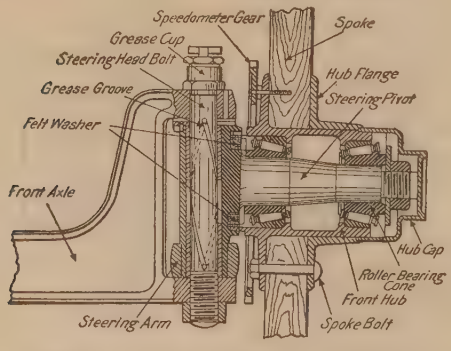
Differential Gear.—The space passed over in one or many revolutions by the circumferences of a pair of rear wheels of a car will be the

same when the car is moving in a lineal direction at right angles to their axis. In mathematical terms the axes of all four wheels intersect at an infinite distance. As soon as the car turns to move in a curve or arc of a circle of



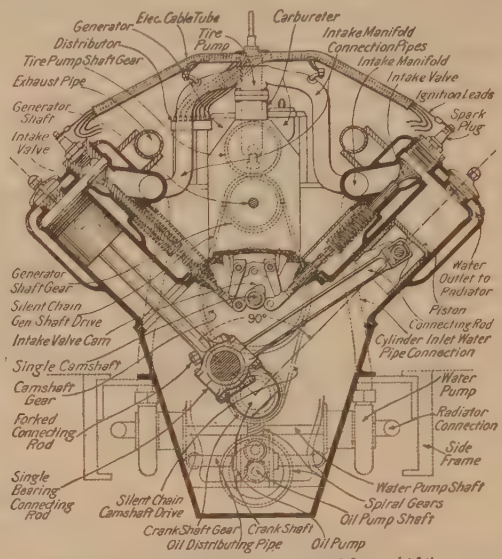
BEVEL AND DIFFERENTIAL GEARS.

finite radius, the wheels on the rear axle revolve on arcs of differing radius and hence of differing length for any angular motion of such axle. This will make one or the other of these wheels slip—usually the outer one, or one of longer path, since the inertia of the wheel as a whole helps motion in the direction it has to go. Such slipping, due to unequal track length, would wear the tires, waste propelling energy, and make hard riding. To correct it a provision is made, usually in the axle housing of shaft-driven cars or in the gear box of chain-driven cars, whereby this differential motion or difference in wheel path may be compensated for. The simplest arrangement is to provide that two, three, or four gears, bevel or spur, shall be planetarily mounted, so that their axes shall be borne in the body of the gear which received motion from the motor. These planetary gears mesh with two others, one being on the axle



VERTICAL TRANSVERSE SECTION OF FRONT HUB.

of the right wheel and the other on the axle of the left. When the resistance is equal at the tires of both car wheels, there is no motion around the axis of the intermediate gears. As soon as one driving wheel demands a shorter path than the other, these intermediate gears begin to revolve around their axes while still driving both axles, and compensate or give a differential motion to the two driving wheels as required. This is a very old mechanical device or movement and has been called the jack-in-the-box. The differential is usually carried

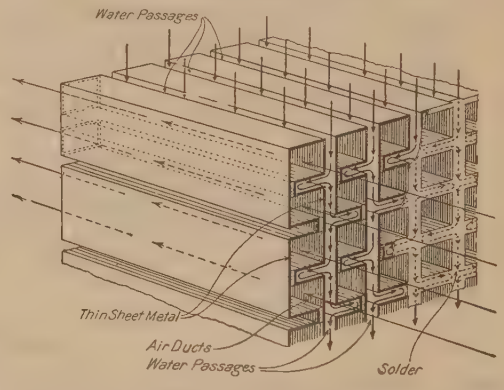


Note: All machine parts and apparatus located forward of the plane of section are shown by broken lines.

A TYPICAL V-TYPE EIGHT-CYLINDER ENGINE.
Vertical cross section through pair of forward cylinders.

in an enlargement of the axle casing, and should be kept well supplied with oil or grease.

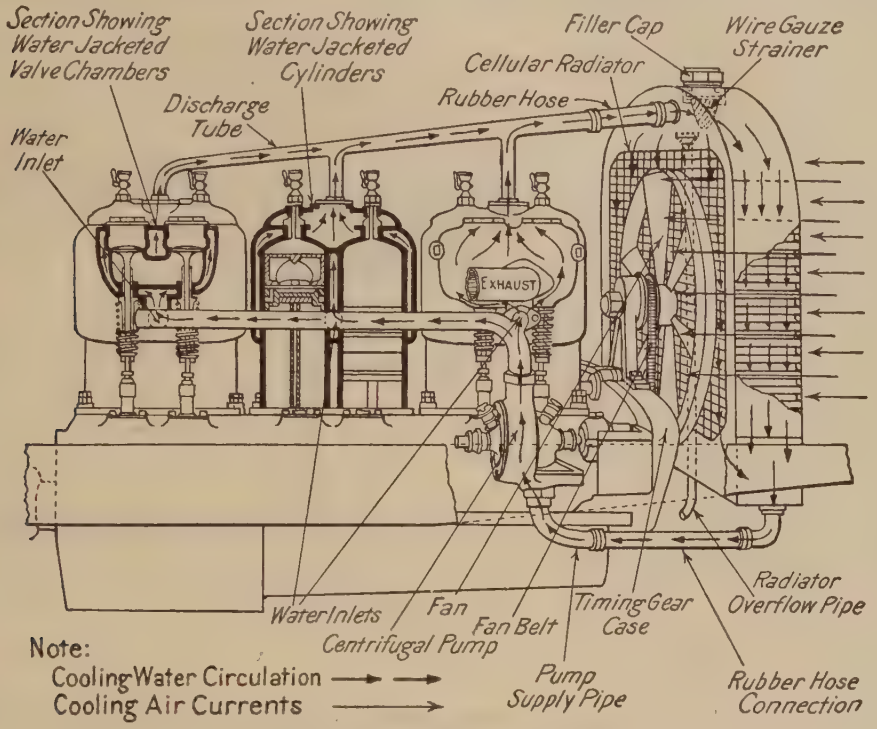
Steering Gear.—The horse-drawn vehicle has the motor force connected to the front axle and at right angles thereto at all times. The motor car driven from the rear axle requires that the front pair of wheels be controlled by the driver. The principle of easy steering and control was first pointed out by Ackerman. Unlike the horse-drawn vehicle, where the axis of revolution of each of the front wheels is in the same line, in a motor vehicle each front wheel is mounted independently, so that in steering, its plane of revolution may be rotated about a vertical axis at either end of the front axle. This is secured by mounting the front wheel on a



CELLULAR RADIATOR.
Sectional view, showing structure.

knuckle which is adjustable for position around a vertical pin borne in the forging of the front axle. These two knuckles are coupled together by a rod of sufficient strength which connects

to an arm on each, and these arms are so located as to converge slightly when the wheels are parallel. When these arms are moved laterally in the operation of steering, the wheels are made to depart from parallelism, the outer all the shocks of the road which tend to swerve the front wheels. The steering-control wheel is borne in a hollow steering post, strongly attached to the frame. The steering knuckles, rods, and arms, and the teeth of the gears must

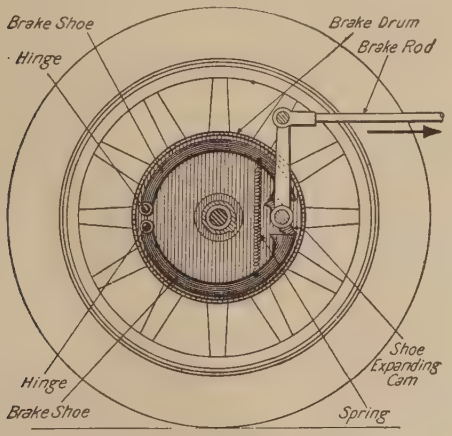


TYPICAL COOLING SYSTEM OF ENGINE.

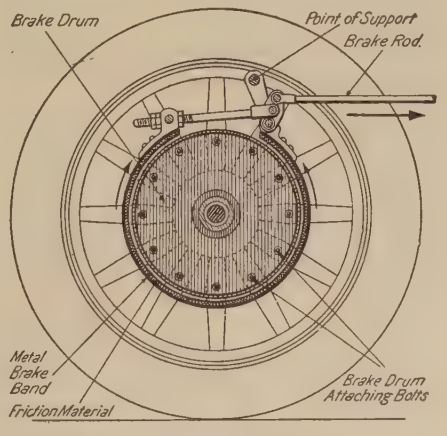
wheel moving through a greater angle than the inner. Hence the Ackerman principle can be closely realized by very simple means. The early knuckles were connected to a lever or tiller when cars were light and speeds low. Modern control is by a wheel which turns a screw or worm, the latter meshing into a section of a worm wheel. The screw gear makes a transmission which is nearly irreversible, so that the driver does not have to resist with his muscles

be massive enough not to break under shock and stress.

Floating Axle. Live Axle.—In the chain-driven cars the sprocket-gear toothed wheel will be a part of the running wheel; hence the rear axle need not turn in bearings. The bearings will be in the wheel hub. Such an axle as must turn in order to drive the wheel will be called a live axle. In shaft-driven cars the weight of the car may be borne upon a hollow casing to



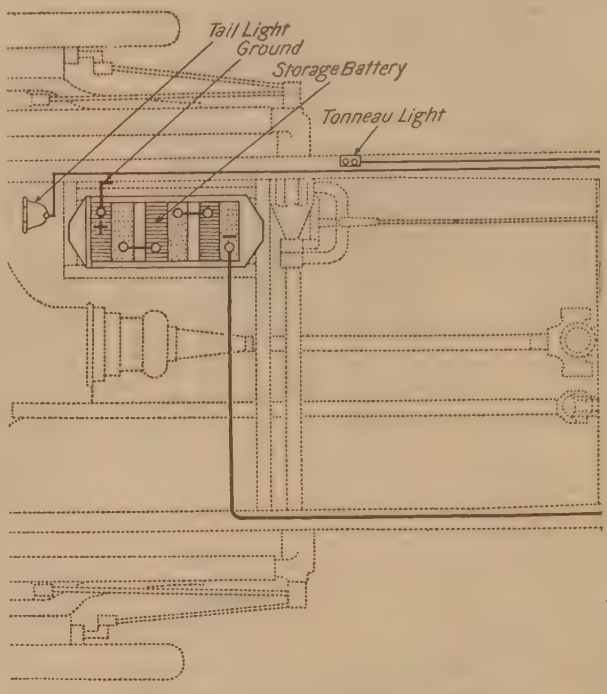
INTERNAL EXPANDING SHOE BRAKE.



EXTERNAL CONTRACTING BAND BRAKE.

which the spring seats will be attached, and the driving axle may pass through the tubular casing out to the wheel hub without contact with the latter. The outer end of the axle is splined so as to compel the wheel to turn, but the axle is exposed to torsion stresses only. Such an axle as carries no bending stresses is called a *floating axle*, or a full-floating axle. A semi-floating axle is one in which the axle itself at its outer end is fitted to the weight-carrying bearings and is therefore exposed to transverse bending stress at its outer end.

The varying speeds and resistances of the motor vehicle make the four-stroke or Otto-cycle preferable to the Clark or two-cycle principle for motor-vehicle engines. (See INTERNAL-COMBUSTION ENGINE.) To secure uniformity of turning effort for the crank shaft and to balance the weights in motion about it, the four-cylinder single-acting design has been preferred, one cylinder being always in action to drive the shaft. The vertical cylinder axis makes the most convenient and accessible arrangement. Six cylinders arranged tandem give an overlapping of effort, so that as one becomes weaker in propelling effect another is just coming into action. Six cylinders have therefore a greater range of power before the gear-driving ratio needs to be altered, and make a more powerful motor on the high gears, but they use more fuel, and the car is proportionately heavier and with more parts. In some designs the cylinders are arranged with the axes at 45 degrees from the vertical, or as it were on the arms of a V, and this is often the arrangement where eight cylinders are employed.



TYPICAL ELECTRIC POWER AND LIGHTING SYSTEM OF A MODERN HIGH-GRADE CAR.

STORAGE BATTERY AND LIGHTING CIRCUITS FOR REAR OF CAR.

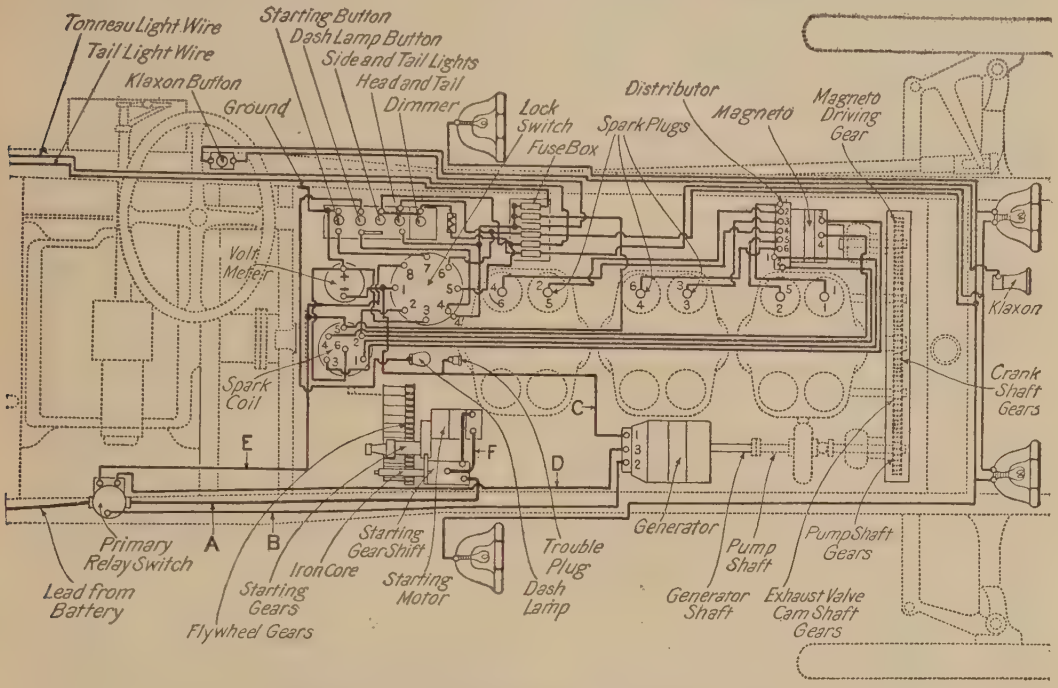
The cylinders are cast in two blocks of four cylinders each, with water jackets, combination chambers, and intake manifold integral, and the two blocks are mounted on the crank case at an angle of 90 degrees to each other. The crank shaft has four throws, all in one plane, similar to that of a four-cylinder motor, excepting that each throw operates the two connecting rods from the pistons of the corresponding pair of opposite cylinders. One connecting rod of the pair is forked at the lower end, and the lower end of the rod fits inside the fork. The motors have a single cam shaft located directly above the crank shaft and operated by the latter through silent chain device. The cam shaft carries eight cams, each cam operating two valves on opposite cylinders. The valves are operated in pairs—four cams operating the eight intake valves and four cams operating the eight exhaust valves. The cylinders being of the L-head type, the intake and exhaust valves are all on the same side of the respective cylinder blocks. In firing the power stroke from a cylinder on one side is followed by a power stroke from a cylinder on the opposite side. The eight power impulses thus obtained during each complete cycle of two revolutions give a power impulse for every quarter turn of the flywheel, thus insuring a constant torque. The motor employs only one carburetor. It is provided with two cooling water pumps, an oil pump, and a tire pump. In other respects, such as electric ignition, starting, and lighting, it is similar to other standard motors.

The older and standard designs of engines have lifting or poppet valves. These when worn are easy to grind to their seat so as to be made tight and require no lubrication. Sliding sleeve, rotating cylindrical and conical valves are competing with the lifting type to diminish clearance losses and noise. They must be copiously lubricated, and the difficulties from a deposit of carbon on or near the sliding surfaces must be overcome, as well as a tendency to grow out of round by the continual action of heat. They cannot be reground when worn or scored.

To cool the water which circulates around the cylinders and valve chambers, a radiator is constructed to subdivide the circulating fluid into small currents and bring every channel into close contact with the air tubes. A driven fan keeps up an air movement more rapid than that of the car itself and increases the radiation. The control of the motor by spark and throttle is effected by levers on the steering post. Foot levers throw the clutch in or out, apply the brake, and control fuel supply in supplement to or substitute for the hand throttle or gas lever. The foot brake is often called the *service brake* and is powerful enough to lock the wheels. The hand brake is sometimes called the *emergency brake* and is to be available in case the foot brake fails in an emergency. It usually is fitted with a spring dog engaging into teeth on a sector, so that the brake can be locked on, holding the car even against the motor when the foot brake is released by the driver leaving his seat.

MECHANICAL STARTER

Self-Starter. The internal-combustion motor used on most motor vehicles requires that one or more strokes of the engine piston be made by some force external to such engine before the cycle of operations can be restarted after a stop. The first method of doing this was by a hand-operated crank. This was so designed and installed that as soon as the motor took up its own functioning the hand crank was unlocked and thrown out of gear by a spring releasing a jaw clutch which worked in one direction only. A spring can also be used to start the motor, by having the motor wind it up to sufficient tension before the crank shaft stopped revolving before the stop. Latterly either the energy in compressed air stored by pumping it into a tank at 150 to 200 pounds' pressure per square inch has been applied, or an electric motor operated from a storage battery in the car can be similarly used. In compressed-air systems the pump is driven by the engine until the desired tank pressure is reached, when it



TYPICAL ELECTRIC POWER AND LIGHTING SYSTEM OF A MODERN HIGH-GRADE CAR.

GENERAL CIRCUIT CONNECTIONS FOR SELF-STARTER, LIGHTING SYSTEM, ETC.

The battery is grounded on the positive side. A heavy cable lead connects the battery with the primary relay switch. Ordinarily this switch is open and no current can flow through the cable *A* beyond the switch. Current flows through the wire *B* and through the series field of the generator, out through the wire *C* to terminal 1 on the lock switch. The generator terminal 3 is so connected with an automatic switch on the generator that it has voltage only when the generator is not running or is running below 300 r.p.m. A wire *D* connects generator terminal 3 with a magnet coil in the primary relay switch. A wire *E* runs from the magnet coil to terminal 8 on the lock switch, through the switch and out from the terminal 7 to the starting button on the four-gang switch.

Starting the Engine. — When the starting button is pressed current flows along the wires *D* and *E*, through the lock switch and the starting button to the ground. The magnet in the primary relay switch closes the circuit, and current flows through the wire *A* to the starting gear shift, energizing a powerful electromagnet and passing through the wire *F* to the starting motor. The energized magnet pulls the iron coil inward against the pressure of a spring, thereby pulling the starting gear into mesh with the flywheel gear. A copper mushroom inside the switch base connects two copper fingers through a resistance in service with the starting motor, closes the main circuit to the motor, which cranks over the engine. When the engine starts firing the generator voltage builds up and opposes the battery voltage at the generator terminal 3. This allows the primary relay switch to open by the pressure of a spring contained therein, thereby cutting off the current flowing through the wire *A* and demagnetizing the electromagnet in the starting gear shift. This allows the spring to push out the iron coil, thereby pulling the starting and flywheel gears out of mesh.

Lighting Circuit Connections. — The lock switch terminals are connected as follows: 1 is connected to the battery and generator feed wire *C*, supplying the lighting system; 2 is connected to the terminal 2 on the spark coil; 3 is connected to the grounded side of the voltmeter; 4 is connected to the side and tail light bus on the four-gang switch; 4 is connected to the headlight terminal on the four-gang switch, and to the Klaxon, tonneau light, and ignition fuse bus; 5 is connected to the tail-light wire on the lamp side of the four-gang switch, also to the driver button operating through a 0.5-ohm resistance coil; 6 is connected to the side-light wires on the lamp side of the four-gang switch; 7 connects with the starting button on the four-gang switch; 8 is connected with the magnet coil in the primary relay switch. The lock switch has three positions. In the "on" position the starting gear shift and motor, all the lights, the Klaxon, and ignition can be operated by the button on the four-gang switch. In the "day" position all the starting, lighting, Klaxon, and ignition circuits are disconnected and cannot be operated; while terminals 2 and 3 are connected, grounding the magneto. In the "night" position terminals 2 and 3 are connected, grounding the magneto; 5 and 6 are connected to the battery, allowing current to flow direct to the side and tail lights, so that they cannot be turned off by the buttons on the four-gang switch. All the other circuits are disconnected.

Ignition Connections. — Terminal 2 of the lock switch is connected to terminal 2 of the spark coil. The terminals 1, 2, 3, 4, are connected to the correspondingly numbered terminals on the magneto. The terminal 5 is connected to the primary relay switch, battery, and ground; 6, the centre post of the coil, is connected to the posterior side of the voltmeter, connected to lock switch terminal 3, which is the grounding terminal for the magneto. The high-tension cables are connected to the distribution terminals in the order of rotation 1, 2, 3, 4, 5, 6; the other ends of the cables go to the spark plugs in the order of firing, 1, 5, 3, 6, 2, 4.

is disengaged. When the engine is to be started this compressed air is released through proper valves into one or more cylinders. The compressed air can also be used for inflating the tubes of pneumatic tires. The pump is lighter in weight than the electric motor of the other system, and the air tank lighter than the battery. In electric systems a pressure on a foot treadle first starts the motor slowly and then throws an engaging clutch into gear, turning the engine slowly until it begins to speed up under its own power. The clutch is then automatically disengaged so as not to turn the motor armature backward. A typical electric self-starting mechanism is shown in the accompanying figure.

RUNNING GEAR AND SPRINGS

III. The third section of the subject is the running gear, wheels and springs. As the motor vehicle is the derivative of the motor tricycle, there has been a drift towards the use of three wheels at different times, but usually as a transition type. The three-wheeled vehicle is not so stable against overturning as the four, particularly on roads of high crown and deep ditches and on curves. The rubber-tired wheel with a pneumatic tube filled with compressed air consumes the least power and is easiest for the passengers. Commercial vehicles for slow speed and heavy loads have solid or cushioned tires. Six-wheeled vehicles for very heavy weights distribute the pavement load, and are made with the wheels either independent or fitted with compensating levers when four wheels of the six are drivers, as in the Dow system. Springs are flat and elliptic or semi-elliptic on pleasure vehicles and flat-leaved or locomotive platform type for heavy-load trucks. Brakes are in duplicate, so that failure of one pair will find the other pair in service. Usually one pair is foot-operated and one pair hand-operated, the latter arranged to lock the brakes when the vehicle is left standing. The brakes should be capable of locking the wheels on ordinary road surfaces and of retarding the motion of the car in less time than the adhesion of the clutch will allow it to be accelerated.

The frames are of steel, usually of standard channel section, either plain or reënforced with wood. Mud guards are attached over the wheels to protect both the body and its occupants.

RACING

Specially designed cars with abnormally high gearing for speed and much higher power than can be utilized in the ordinary vehicle have given very high speed records on special courses and tracks or on sea beaches where a hard surface can be secured. Regular race meets long have been a commercial feature both for the gate receipts and for the advertising value of success against competitors. They also give a hard try-out to the machinery and construction of the motor and running gear. Originally these motor races were held on the public highways which were policed and marked, but becoming so dangerous to both contestants and spectators they were restricted to specially constructed speed courses or beaches. Two of the most important meets were known as the race for the Grand Prix of the Automobile Clubs and the race for the Vanderbilt Cup. The Vanderbilt Cup Race in 1901 was held for the first time over a special course on Long Island instead of on the highway. The winning machine, a 60-horse-power car with six-cylinder engine, made the 278 miles of the course in 4 hours, 25 minutes, and 42 seconds, or at an average speed of 62.8 miles an hour. The concluding races for both these trophies were held at Santa Monica, Calif. in 1916. In the Vanderbilt Cup Competition a Peugot special car was driven 294.035 miles in 3 hours 22 minutes 48 seconds which also won the grand prize driving 403.238 miles in 4 hours 42 minutes 47 seconds. At Daytona a Dusenberg car on April 27, 1920 made a mile in 23.07 seconds (157 miles an hour) and two miles in 46.24 seconds while on Feb. 17, 1919 a Packard special was driven 10 miles in 4 minutes 9.31 seconds (145 miles an hour) and 20 miles in 8 minutes 54.20 seconds. In 1908 the longest competition ever held, from New York to Paris, took place, and was won by an American car, which covered the distance of 12,116 miles in 112 days.

The manufacture of automobiles has become an important industry, the greatest work having been done in the construction of vehicles for touring and recreation; and for this purpose numerous factories have been established, both in the United States and in Europe. The value of automobiles produced in the United States in 1919 according to the census of manufactures was $2,387,903,287 against $249,202,000 in 1909. The year 1920 marked the high water mark. The exports grew from approximately $10,000,000 in 1910 to $212,031,702 in 1920 falling off considerably in 1921. In 1915 and 1916 the exportation was greatly increased, especially in trucks, which were greatly in demand for use in transportation during the European War.

Bibliography. There is a growing literature, as well as a number of journals, devoted to Motor Vehicles. The early history of steam vehicles, in common with that of other forms of steam engines, will be found in R. H. Thurston, *A History of the Growth of the Steam Engine* (New York, 1901). For a comprehensive descriptive treatise, consult: W. W. Beaumont, *Motor Vehicles and Motors* (London, 1901); also R. B. Whitman, *Motor-car Principles* (rev. ed., New York, 1909); Cyclopaedia of Automobile Engineering (Chicago, 1915); Fraser and Jones, *Motor Vehicles and their Engines* (New York, 1919); F. A. Talbot, *Motor Cars and their Story* (ib., 1912); V. W. Pagé, *Modern Gasoline Automobile* (ib., 1918); id., *The Modern Motor Truck* (ib., 1921); W. H. Berry, *Modern Motor Car Practice* (London, 1921); F. V. Z. Lane, *Motor Truck Transportation* (New York, 1921); H. P. Manly, *The Modern Motor Car* (Chicago, 1918); Brokaw and Starr, *Putnam's Automobile Handbook* (New York, 1916). See AUTOMOBILE; CYCLE CAR; MOTOR CYCLE.

MOTRIL, mō-trēl′. A city and port of entry in south Spain, in the Province of Granada, situated about 1 mile from the Mediterranean coast, 32 miles south by east of Granada (Map: Spain, D 4). There are ruins of old Moorish fortifications, but the greater part is well built with modern houses. Motril is chiefly an industrial town, has iron foundries, and manufactures sugar, spirits, chocolate, flour, soap, paper, cotton textiles, and pottery. The harbor is an exposed roadstead. Pop., 1900, 18,508; 1910, 18,444.

MOTT, ALEXANDER BROWN (1826–89). An American surgeon, son of Valentine Mott. He

was born in New York City and studied at University Medical College, New York, and the Vermont Academy of Medicine, Castleton, graduating in 1850 (M.D., University of Pennsylvania, 1857). Settling in his native city, he served as medical director there during the Civil War and from 1862 to 1864 was surgeon at the United States Army General Hospital. In the latter year he was ordered to the front as medical inspector of the Department of Virginia and was attached to General Ord's staff. In 1865 he was mustered out of service with the brevet rank of colonel. At Bellevue Medical College, which he had helped to found, he held the chair of surgical anatomy from 1861 to 1872 and from 1872 to 1889 that of clinical and operative surgery. He was the author of *Surgical Operations* (3 vols., 1856–57), *Advantages of Clinical Teaching* (1868), etc.

MOTT, JAMES (1788–1868). An American Abolitionist, born at Cowneck, Long Island, N. Y. Soon after completing his education he became a teacher in a Friends' boarding school in Dutchess Co., N. Y., where he met Lucretia Coffin (see MOTT, LUCRETIA), whom he afterward married. In 1810 he removed to Philadelphia and became a merchant. He early manifested his sympathy with the antislavery movement and was one of the first supporters of William Lloyd Garrison. He was one of the organizers of the Philadelphia National Antislavery Society in 1833, and in 1840 he was a delegate to the World's Antislavery Convention in London. There he took a prominent part in the agitation to admit women delegates and eight years later presided over the first national convention held in support of the woman's rights movement. In 1865–69 he was actively interested in the establishment of Swarthmore College by the Philadelphia Yearly Meeting, of which he was a member.

MOTT, JOHN R(ALEIGH) (1865–). An American Y. M. C. A. leader and authority on foreign missions. He was born at Livingston Manor, N. Y., graduated from Cornell University in 1888, and in the same year became student secretary of the international committee of the Y. M. C. A. and chairman of the executive committee of the Student Volunteer movement. He became general secretary of the World's Student Christian Federation in 1895, foreign secretary in 1898 and associate general secretary in 1901 of the international committee of the Y. M. C. A., and chairman of the continuation committee of the World Missionary Conference in 1910. His lectures and conferences on Y. M. C. A. and mission work brought him large influence throughout the United States. Dr. Mott declined the presidency of Princeton University, to succeed Woodrow Wilson, and in 1913, when Mr. Wilson offered him the post of Minister to China, declined that also. Yale, Edinburgh, and Princeton gave him honorary degrees. Besides pamphlets and articles he is the author of *Strategic Points in the World's Conquest* (1897); *The Evangelization of the World in this Generation* (1900); *Christians of Reality* (1902); *The Pastor and Modern Missions* (1904); *The Future Leadership of the Church* (1908); *The Decisive Hour of Christian Missions* (1910; Ger. trans., 1911; 2d Ger. ed., 1912); *The Present World Situation* (1914).

MOTT, LEWIS FREEMAN (1863–). An American English scholar, born in New York and educated at the City College (S.B., 1883) and at Columbia University (Ph.D., 1896). In 1884 he became a tutor at the City College and held that position until 1897, when he was made professor of English. He served as president of the Modern Language Association in 1911 and, in addition to various scholarly pamphlets, is the author of *The System of Courtly Love* (1894) and *The Provençal Lyric* (1901).

MOTT, LUCRETIA (COFFIN) (1793–1880). An American Abolitionist and woman's rights advocate, born on Nantucket Island. She was educated in the Friends' School at Nine Partners, near Poughkeepsie, N. Y., where she met James Mott (q.v.), whom in 1818 she married. She became prominent as a preacher in the Society of Friends and was chosen a minister. As a result of a visit to Virginia in 1818 she became an ardent advocate of emancipation. At the Separation of 1827 which divided the Society of Friends into two hostile factions, she and her husband adhered to the liberal or Hicksite party. (See HICKS, ELIAS.) In 1833 she attended as an invited guest the first convention of the American Antislavery Society, of which her husband was a member. Soon afterward she helped to organize the Female Antislavery Society, of which she continued one of the leaders until 1839, when it was merged in the men's organization. As the feeling against Abolitionists grew in intensity, many of the more timid Quakers began to deprecate any discussion of slavery by one of their ministers, and even in her own meeting she was regarded with suspicion and dislike. In 1840, at the World's Antislavery Convention in London, to which both James and Lucretia Mott had been chosen delegates, the question of the equal participation of women in the proceedings of the convention came up, and after some discussion all women were excluded. This action may be said to have started a movement for the emancipation of women from legal and political disabilities in the United States and England and, in a lesser degree, in France. It was then that Lucretia Mott and Elizabeth Cady Stanton first discussed the woman's rights movement, which they launched eight years later at a convention in Seneca Falls, N. Y. But these two movements, abolition and woman's rights, while they received the greater share of her attention, were not the only ones in which Mrs. Mott was interested, for all that promised to uplift humanity or to break the fetters of ignorance and tradition received her warmest support. Almost to the end of her life she made frequent journeys to visit distant meetings or to attend conventions called to consider the elevation of woman, the promotion of temperance, and the establishment of universal peace. Consult A. D. Hallowell, *The Life and Letters of James and Lucretia Mott* (Boston, 1884).

MOTT, VALENTINE (1785–1865). An American surgeon, born at Glen Cove, N. Y. He studied medicine at Columbia College and graduated in 1806, taking postgraduate courses in London and Edinburgh. In 1810 he was appointed to fill the chair of surgery at Columbia College, in which position he was continued after the medical department of that institution was united with the College of Physicians and Surgeons in 1813. In 1826 he was one of the founders of the Rutgers Medical College, which was disbanded four years later. He then returned to the College of Physicians and Sur-

geons, but resigned on account of failing health in 1835. After a prolonged stay in Europe he returned in 1841. In the same year he assisted in founding the New York University Medical College, whose president and professor of surgery he was until 1850. From 1850 to 1852 he again traveled in Europe. Mott was celebrated as a skillful operator in all branches of surgery and was the inventor of several valuable surgical instruments. He introduced an operation for immobility of the lower jaw and in 1821 performed the first operation for osteosarcoma of that member. He performed the operation of lithotomy 165 times and amputated more than 1000 limbs. Many foreign distinctions were conferred on him, and he was a member of many learned societies. He died in New York. His library of over 4000 medical works is now in the New York Academy of Medicine. He published an account of his first European journey in 1842, *Travels in Europe and the East*, and published also a translation of Velpeau's *Surgical Anatomy* and a volume of clinical lectures (1860). Among Dr. Mott's essays may be mentioned: *An Experimental Inquiry into the Chemical and Medical Properties of the Statice Limonium of Linnæus* (1806); *Reminiscences of Medical Teaching and Teachers in New York* (1850); *Pain and Anæsthetics* (1862; 2d ed., 1863). Consult T. D. Gross, *Memoir of Valentine Mott* (Philadelphia, 1868).

MOTTA, môt'tȧ, José Vianna da (1868–). A Portuguese pianist and composer, born on the island of St. Thomas, Gulf of Guinea. He studied at Lisbon, attended the Klindworth-Scharwenka Conservatory in Berlin, and was a pupil of Liszt at Weimar in 1885, of Schäffer at Breslau, and of Von Bülow at Frankfort-on-the-Main in 1887. He made concert tours in Germany, Russia, Portugal, France, England, Brazil, Argentina, and the United States. Motta composed several songs and piano pieces, a symphony, and the cantata *Lusiaden*, and is the author of *Studien bei Hans von Bülow* (1896).

MOTTARONE, môt'tȧ-rō'nȧ, Mount. A mountain in Italy on the west shore of Lake Maggiore (q.v.). It is 4892 feet high and is often called the "Rigi of North Italy." The view is magnificently extended. At one's feet lie Maggiore and six other lakes; across Maggiore, 60 miles to the southeast, may often be seen the cathedral of Milan, and to the north rise the Alps.

MOTTE FOUQUÉ, Baron de La. See La Motte Fouqué, F. H. K.

MOTTE-GUYON. See Guyon, J. M. B. de la Motte-.

MOTTEUX, mô'tē', Peter Anthony (1660–1718). A French-English playwright and translator, born at Rouen in Normandy. He went to London on the revocation of the Edict of Nantes in 1685 and afterward opened a warehouse in Leadenhall Street, where he sold "tea, china, and Indian wares" (described in the *Spectator*, No. 552). In 1693 appeared Boileau's *Ode sur la prise de Namur, avec une parodie de la même ode par le Sieur P. Motteux.* Motteux mastered English in eight years, and in 1694 appeared one of the two works which made him famous. With Sir Thomas Urquhart and others he published in three volumes a translation of Rabelais (books i-iii), the remainder of which followed in 1768 (books iv-v). For the stage he wrote comedies, masques, and operas. But his fame rests wholly on his Rabelais and on his admirable version of *Don Quixote.* Motteux died on Feb. 18, 1718, his birthday anniversary, in a brothel near St. Clement's Church. Though several persons were held for his murder, it is more likely that he died of disease.

MOTTEVILLE, môt'vēl', Françoise Bertaut de (1621–89). A French writer, born at Paris. She was a member of the household of Anne of Austria, wife of Louis XIII, was exiled by Richelieu, but returned to court in 1642. She was devoted to the Queen and faithful to her to the very end. Her *Mémoires* are important because of the details of court life and the historical setting of the war of the Fronde (q.v.). They may be compared, for their keen insight into the manners and customs of the time, to the letters of Madame de Sévigné and the memoirs of the Cardinal de Retz (qq.v.). The *Mémoires* were translated by K. P. Wormeley (3 vols., London, 1902).

MOTTIER, mōt-tēr', David Myers (1865–). An American botanist. He was born at Patriot, Switzerland Co., Ind., and was educated at Indiana University (A.B., 1891; A.M., 1892) and at Bonn (Ph.D., 1897) and Leipzig (1898). At Indiana University he was instructor in botany (1891–93), associate professor (1893–98), and professor after 1898. He served as president of the Indiana Academy of Science in 1907. His writings include *A Practical Laboratory Guide for First Year in Botany* (1902) and *Fecundation in Plants* (1904).

MOTTL, mōt'l, Felix (1856–1911). An Austrian composer and musical conductor, born in Vienna. He studied at the conservatory there under Hellmesberger, Dessoff, and Bruckner and won a number of prizes. In 1881 he became court chapel master at Karlsruhe and conducted the philharmonic concerts till 1892. In 1886 he conducted at Bayreuth, and in 1893 he was appointed general musical director at Karlsruhe. Here his most noteworthy undertaking was the initial production at Karlsruhe of Berlioz's great two-part opera, *Les Troyens.* From 1903 until his death he held the position of general music director at Munich. During the season of 1903–04 he directed some performances at the Metropolitan Opera House. Although he had been engaged specially to conduct the first American Parsifal performances, he finally declined to direct that work, owing to the opposition of the Wagner family. He wrote the operas *Agnes Bernauer* (1880) and *Fürst und Sänger* (1892); a festival play, *Eberstein;* a singspiel, *Pan im Busch;* and a string quartet. Together with H. Levi (q.v.) he completely reorchestrated Cornelius' *Barbier von Bagdad* (1884), and also edited Wagner's early overtures—*König Enzio, Polonia, Christoph Columbus, Rule Britannia.* Consult Erich Kloss, "Felix Mottl," in *Monographien Moderner Musiker*, vol. iii (Leipzig, 1909).

MOTTO (It., a saying). In heraldry, a word or short sentence which forms an accompaniment to a coat of arms, crest, or household badge. Mottoes were originally the battle cries of the knights who used them. They were attached to the badge, when the family had one, or to the crest, when there was no badge. See Heraldry.

MOTUCA (mō-tōō'kȧ) **FLY.** A gadfly (q.v.) which abounds in parts of Brazil and makes, in biting, a large and deep cut which may bleed considerably. As this fly (*Hadrus lepido-*

tus) sometimes settles in numbers on human beings, it is deservedly feared.

MOUBATA (mōō-bä′tȧ) **BUG.** See MITE.

MOUCHES VOLANTES, mōōsh vô′lȧNt′. See MUSCÆ VOLITANTES.

MOUCHEZ, mōō′shĕz′, AMÉDÉE ERNEST BARTHÉLEMY (1821–92). A French naval officer and astronomer, born at Madrid. He studied in the French Naval Academy at Brest and served with distinction in the navy until 1878, when he succeeded Leverrier as head of the National Observatory. In 1880 he was made rear admiral. He had already shown himself an able and industrious scientist in the coast surveys of Brazil and Algeria and as organizer of the expedition to the island of St. Paul to observe the transit of Venus in 1874. In his new post he greatly improved the equipment of the observatory, brought out a score of volumes of the *Annales* and a part of the catalogues listing all stars observed since 1838, and, above all, planned the international photographic chart of the heavens. He wrote: *Côtes du Brésil* (1864–74); *Rio de la Plata* (1873; 3d ed., 1891); *La photographie astronomique à l'observatoire de Paris et la carte du ciel* (1887).

MOUFLON, mōōf′lŏn (Fr.). A wild sheep (*Ovis musimon*) now, and perhaps always, restricted to the islands of Corsica and Sardinia, where it is confined to the highest parts of the mountains. The rams stand about 27 inches high at the shoulders, carry immense horns, and have an abundant mane about the neck, shoulders, and breast. This mane is ashy gray, but the body is rusty red, lighter on the sides and stern, and with a dark line along the spine. The belly, sides of the tail, feet, and nose are white. The females are more dun-colored, so that they are almost invisible among the rocks. During the winter flocks of several hundred formerly gathered and ranged the mountains until spring, when they separated into family parties of three or four ewes and lambs, led by an old ram; but now large flocks are uncommon. The rutting season is in midwinter; the lambs—one or two at a birth—are produced in April or May. The animals have now become very wary and on that account offer most excellent sport to hunters. Consult books of European natural history and sport, especially Aflalo, *Sport in Europe* (London, 1901).

The term is sometimes extended to the aoudad (q.v.), and more especially to a slightly smaller sheep (*Ovis ophion*), with lighter horns, which is confined to the mountains of Cyprus and called the Cyprian mouflon.

MOUKDEN, mōōk-dĕn′. The capital of Manchuria. See MUKDEN.

MOULD. See MOLD.

MOULDING. See MOLDING.

MOULE, moul, ARTHUR EVANS (1836–). An English missionary to China. He was the son of the vicar at Fordington, Dorset, and was educated at Malta College and the Islington Church Missionary Society College. In 1861 he went out to China, where he arrived in time to witness some of the stirring scenes of the Taiping Rebellion. He worked in the vicinity of Ningpo in 1861–69 and in 1871–76; at Hankow (where his brother had founded, in 1869, the first inland mission residence) from 1876 to 1879; in Shanghai in 1882–94; and, after eight years at home, in Chekiang and Kiangsu from 1902 to his retirement in 1910, having been Archdeacon in the diocese of Mid-China for 30 years. In Chinese he published tracts, sermons, a commentary on the Thirty-nine Articles, "A Letter to the Scholars of China," etc.; and in English: *Chinese Stories* (1880); *New China and Old* (1891; 3d ed., 1902); *Half a Century in China* (1911); *The Chinese People: A Handbook on China* (1914).

MOULIN ROUGE, mōō′lăN′ rōōzh (Fr., Red Mill). A well-known dance hall on the right bank of the Seine in Paris, which, since the disappearance of the Jardin Mabille, has been one of the chief places of popular amusement.

MOULINS, mōō′lăN′. The capital of the Department of Allier, France, on the Allier, 36 miles northeast of Montluçon (Map: France, S., H 2). It is a well-built town, with pleasant, beautifully shaded promenades and many places of interest, chief among them the Hôtel de Ville, with a magnificent library and valuable manuscripts, the cathedral of Notre Dame and its art treasures, the Archæological Museum, the church of the Sacred Heart, and the Lycée. There are a seminary, two religious colleges, and a school of music. Industries include the manufacture of glassware, farm tools, paper, hats, oil, vinegar, cotton and woolen fabrics, and silk; there is an important trade in coal, wood, grain, and wine. Moulins was for a time the capital of Bourbonnais and the residence of the dukes of Bourbon; of the ducal castle, a fourteenth-century tower, now used as a prison, remains. Pop., 1901, 22,340; 1911, 21,990.

MOULMEIN, moul-mīn′. A city in Lower Burma. See MAULMAIN.

MOULTING. See MOLTING.

MOULTON, mōl′ton, FOREST RAY (1872–). An American astronomer, born at Le Roy, Mich. He graduated from Albion College (A.B., 1894) and from the University of Chicago (Ph.D., 1899), where he was associate in astronomy (1898–1900), instructor (1900–03), assistant professor (1903–08), associate professor (1908–12), and professor after 1912. He became an associate editor of the *Transactions of the American Mathematical Society* in 1907 and a research associate of the Carnegie Institution in 1908. Besides various contributions to mathematical and astronomical journals he is the author of *An Introduction to Celestial Mechanics* (1902; 2d rev. ed., 1914); *An Introduction to Astronomy* (1905); *Descriptive Astronomy* (1912); *Periodic Orbits* (1913).

MOULTON, JAMES HOPE (1863–1917). An English Wesleyan Methodist clergyman and philologist. He was born at Richmond College, where his father, Rev. W. F. Moulton (q.v.), was a professor. He was educated at King's College, Cambridge, entered the ministry in 1886, and was elected a member of the Legal Hundred in 1904. He was master at the Leys School, Cambridge, from 1886 to 1902, also lecturing on the classics at Girton and Newnham colleges; was a tutor at Didsbury (Wesleyan) College; and in 1908 became Greenwood professor of Hellenistic Greek and Indo-European philology in Manchester University. In 1911–12 he was dean of the theological faculty of the university. Moulton received honorary degrees from London, Edinburgh, Durham, Berlin, and Groningen. Besides contributions to periodicals and to Hastings' *Dictionary of the Bible* he is the author of: *The Vision of Sin* (1898); *Two Lectures on the Science of Language* (1903); *Grammar of New Testament Greek*, vol. i (1906; Ger. trans., 1911); *Early Religious Poetry of*

Persia (1911); *Early Zoroastrianism*, the Hibbert lecture for 1912.

MOULTON, John Fletcher, Baron (1844–1921). An English jurist, brother of Richard Green and William Fiddian Moulton. Born at Madeley and educated at St. John's College, Cambridge, he became a barrister of the Middle Temple in 1874, queen's counsel in 1885, and served in Parliament in 1885–86, in 1894–95, and from 1898 to 1906. Moulton served as judge of the Court of Appeal from 1906 to 1912, when he became Lord of Appeal in Ordinary and member of the judicial committee of the Privy Council. In 1906 he was knighted and in 1912 was created a life peer.

MOULTON, (Ellen) Louise (Chandler) (1835–1908). An American poet and story-writer, born at Pomfret, Conn., April 10, 1835. She was educated at Troy, N. Y., and before her twentieth year had edited *The Waverley Garland, a Present for All Seasons* (1853) and had written *This, That, and the Other* (1854). In 1855 she married William Moulton (died 1898), a Boston publisher and journalist. Repeated periods of residence in England, from 1876 on, made her lasting friends among leading English men and women of letters, and her Boston home was a favorite resort of literary talent. She died Aug. 10, 1908. Her published work includes the following titles: *Juno Clifford: A Tale* (1856); *My Third Book: A Collection of Tales* (1859); *Bedtime Stories* (1873); *More Bedtime Stories* (1874); *Poems* (1876), a notable volume, published (1877) in England as *Swallow-Flights; New Bedtime Stories* (1880); *Random Rambles* (1881); *Firelight Stories* (1883); *Ourselves and our Neighbors* (1887); *Miss Eyre from Boston, and Others* (1889); *In the Garden of Dreams: Lyrics and Sonnets* (1889); *Stories Told by Twilight* (1890); *At the Wind's Will* (1899). Mrs. Moulton edited the poems of Philip Bourke Marston (1892) and of Arthur O'Shaughnessy (1894). A collection of her verse—*Poems and Sonnets* (1900)—includes an introduction by H. P. Spofford.

MOULTON, Richard Green (1849–). An American educator and literary critic, brother of John Fletcher and William Fiddian Moulton. Born at Preston, England, he was educated at London University (B.A., 1869), at Christ's College, Cambridge (M.A., 1877), and at the University of Pennsylvania (Ph.D., 1891). He was university-extension lecturer to Cambridge (1874–90), to the American Society for the Extension of University Teaching (1890–91), and to the London Society (1891–92). Moulton became professor of literature in English at the University of Chicago in 1892 and in 1901 professor of literary theory and interpretation and head of the department of general literature. His works include: *Shakespeare as a Dramatic Artist* (1885); *The Ancient Classical Drama* (1890); *Four Years of Novel Reading* (1895); *The Literary Study of the Bible* (1896; 2d ed., 1899); *A Short Introduction to the Literature of the Bible* (1901)—the last two being supplementary to the *Modern Reader's Bible*, edited in 21 volumes in 1895–98 and republished in 1 volume in 1907; *The Moral System of Shakespeare* (1903), republished as *Shakespeare as a Dramatic Thinker* (1907); *World Literature and its Place in General Culture* (1911); *The Modern Study of Literature* (1915). In the *Modern Reader's Bible*, Moulton, with rare insight into and appreciation of the significance of the text from a literary standpoint, arranged the various books in accordance with modern English usage, as prose narrative, dramatic dialogue, lyric verse, or whatever form seemed appropriate.

MOULTON, William Fiddian (1835–98). An English Wesleyan Methodist clergyman and educator, brother of John Fletcher and Richard Green Moulton and father of James Hope Moulton. He was born at Leek and was educated at Woodhouse Grove School, at Wesley College, Sheffield, and at London University, where he graduated in 1856 and was prize medalist in mathematics and natural philosophy. In 1858 he entered the ministry and in 1872 was elected to the Legal Hundred. He was assistant tutor and classical tutor in Richmond College between 1868 and 1874, when he founded and became the first head master of the Leys School at Cambridge. This position he retained until his death. He was a member of the New Testament Company on the revision of the Scriptures (1870–81), was elected president of the Wesleyan Methodist Conference (1890), from 1873 until his death was secretary of the committee for the examination of the preachers on trial, and in 1891 was a member of the Ecumenical Methodist Conference held at Washington, D. C. He translated and enlarged Winer's *Grammar of New Testament Greek* (1881), with A. S. Geden compiled *A Concordance to the New Testament Greek* (1897), and contributed the comments on the Gospel of John to *The International Revision Commentary* (1879). Consult *William Fiddian Moulton: A Memoir*, by W. Fiddian Moulton, with a chapter by James Hope Moulton (New York, 1899).

MOULTRIE, mōl'trĭ. A city and the county seat of Colquitt Co., Ga., 140 miles south of Macon, on the Atlanta, Birmingham, and Atlantic, the Flint River and Northeastern, the Georgia and Florida, the Valdosta, Moultrie, and Western, and the Georgia Northern railroads (Map: Georgia, C 4). It is a commercial and manufacturing centre, has a meat-packing plant, and produces naval supplies, mattresses, fertilizers, lumber, wool and cotton mill products. The city contains a Carnegie library and a fine government building and owns its water works and electric-light plant. Pop., 1900, 2221; 1910, 3349.

MOULTRIE, Fort. See Fort Moultrie.

MOULTRIE, John (1799–1874). An English poet and clergyman, and rector at Rugby in Thomas Arnold's time. Born in London, educated at Eton and at Cambridge, he was ordained in 1825 and was presented by Lord Craven with the living of Rugby. His friendship with Dr. Arnold is recorded in his poetry, which, in the midst of much that is dull, contains some popular poems—e.g., "Godiva" and "My Brother's Grave"—and several hymns which, in point of poetic quality, are well above most productions in that kind. His poems—originally appearing in several separate volumes—were completely collected in two volumes in 1876.

MOULTRIE, mōō'trĭ *or* mōōl'trĭ, William (1731–1805). An American soldier, prominent in the Revolutionary War. He was born in Charleston, South Carolina, received an ordinary education, and in the Cherokee troubles of 1761 was a military captain. In 1775 he was the representative of St. Helena Parish in the South Carolina Provincial Congress and later

MOUND, ADAMS COUNTY, OHIO

CIRCULAR EARTHWORK, OHIO

in the same year was chosen colonel of a South Carolina regiment. For the defense of Charleston he placed a battery at Haddrell's Point and (March, 1776) began the erection of a rude fort of palmetto logs on Sullivan's Island. This fort commanded the entrance to the harbor and on June 28 was fiercely but unsuccessfully attacked by Admiral Sir Peter Parker. Moultrie had undertaken the defense against the advice and wish of his superior officer, Gen. Charles Lee. For his success he received the thanks of Congress, and in his honor the fort was named Fort Moultrie. In September of the same year he was made a brigadier general and was put in command of the Department of Georgia and South Carolina. He defeated the British under General Gardner at Beaufort in February, 1779, and, by obstructing the advance of Prevost in May, enabled Charleston to prepare for its defense, finally entering the city and holding chief command until the arrival of General Lincoln. On the surrender of Charleston in May, 1780, he became a prisoner, but in February, 1782, he, with several others, was exchanged for Burgoyne. He was made a major general in October of that year and subsequently was twice (in 1785 and in 1794) elected Governor of South Carolina. He retired to private life after his second term and died at Charleston, Sept. 27, 1805. His *Memoirs of the Revolution as Far as it Related to the States of North and South Carolina* (2 vols., 1802) was written in part while he was a prisoner and was finished in later years.

MOUND BIRD. The mound birds are a group of gallinaceous birds, with feet like those of pigeons in not having the hallux raised above the other toes, and related to the American curassows. (See CURASSOW.) They form a family, the Megapodidæ, which, as is indicated by the name, are characterized by the possession of unusually large feet. Although the family contains two subfamilies, the mound birds proper or, as they are called in Australia, jungle fowl, and the brush turkeys (see BRUSH TURKEY), all these birds agree in the remarkable habit which has given them their widely known name. This habit is the building of a huge mound for a nest, within which the eggs are left to be hatched by heat caused by the decay of vegetable matter within the heap. These mounds vary greatly in size and shape as well as in manner of construction, and in the number and arrangement of the eggs which they contain. The simplest are where the birds excavate a hole in the sand in which the eggs are laid, and are then covered with a mixture of sand and vegetable matter. Such is the habit of the lowan, or mallee bird (*Megacephalon maleo*), of Celebes. In most cases, however, the birds scratch up grass, leaves, turf, etc., and with their large feet throw this material together in a heap. The female digs down into such a heap from the top and lays an egg, which is so placed that it is nearer the outside than the top of the mound. Just how the young escape from the mound when the egg hatches is still uncertain, but it is probably by digging through to the side. The young are well developed, feathered, and able to fly as soon as they leave the mound. The number of eggs laid by each female is still a matter of doubt; from 4 to 20 are found in each mound, and there is no doubt that several females often lay in the same heap. The eggs are white when first laid, but soon become stained by the vegetable matter in which they lie. They are remarkably large for the size of the bird and are ellipsoidal rather than oval; they measure from 3 to 4.3 inches in length, according to the species. The birds resort to the same mound season after season, but add fresh material at every egg-laying time; consequently the mounds increase with age and may be in use for many years. They are usually more or less truncatedly conical or crater-like in form, but may have one of the horizontal diameters much longer than the others. The largest one on record was reported to be about 50 feet in diameter and some 14 feet high.

The mound birds themselves are plainly colored and vary in size from a small fowl to a small turkey. They are shy and retiring and are not often seen. They frequent scrub and undergrowth along the seacoast or on the banks of streams emptying into the sea. The mounds are built in open spaces in the thick scrub or on unfrequented parts of the shore. The birds fly little and heavily and are not easily flushed, but sometimes seek shelter in trees. They are said to be noisy at night and to have hoarse call notes which they use during the day. All the Megapodidæ are inhabitants of the Australasian region and are not found north of Celebes; the majority of the species are Australian. The one best known on that continent is the scrub hen, or mound turkey, of Queensland (*Megapodius tumulus*). Another smaller one is the leipoa (*Leipoa ocellata*). The brush turkeys of New Guinea and neighboring islands belong to the genus *Tallegalus*.

Consult Gould and other authorities on the ornithology of Australia. (See BIRD.) See also Campbell, *Nests and Eggs of Australian Birds* (Sheffield, 1900), and id., "Mound-Building Birds" (with photographic illustrations of mounds), in *Bird Lore*, vol. v (New York, 1903).

MOUND BUILDERS. Specifically, a hypothetical race or people at one time supposed to have antedated the Indian tribes as inhabitants of the Ohio and Mississippi valleys; but the mound builders of the Mississippi valley are now regarded merely as the ancestors and representatives of the tribes found in the same region by Spanish, French, and English pioneers. The custom of erecting mounds has been widespread; most primitive peoples are known to have erected mounds either habitually or in some stage of their development. Most of the mounds of the typical regions in central North America are mortuary or sacrificial. The chief contents are skeletons, with ceremonial and other objects buried with the bodies, while the structures are wholly of earth; in a few cases houselike structures form the nucleus of the mound. See ARCHÆOLOGY, AMERICAN; SEPULCHRAL MOUND.

MOUND CITY. A city and the county seat of Pulaski Co., Ill., 8 miles north of Cairo, on the Ohio River and on the Cleveland, Cincinnati, Chicago, and St. Louis Railroad and a branch of the Illinois Central (Map: Illinois, F 11). It has a trade in lumber, shipbuilding interests, and manufactures of lumber, veneer, heading and hoops, etc. In the national cemetery here are 5310 graves, 2732 of unknown dead. Pop., 1900, 2705; 1910, 2837.

MOUNDSVILLE. A city and the county seat of Marshall Co., W. Va., 11 miles south of Wheeling, on the Ohio River and on the Baltimore and Ohio Railroad (Map: West Virginia, D 2). It is the seat of the State penitentiary

and has a fine courthouse, Federal building, Reynolds Memorial Hospital, and a famous relic of the mound builders, a massive structure of conical form, after which the city was named and in which two burial vaults containing skeletons and copper ornaments were discovered by excavations of 1838. The city is in an agricultural and coal-mining region, has important commercial interests as a result of its shipping facilities, and extensively manufactures glass, lumber products, enameled ware, bricks, lamps, metal ceilings, brooms, whips, clothing, cigars, grain cradles, flour and feed, foundry products, leather, etc. The government is vested in a mayor, elected every two years, and a unicameral council. Pop., 1900, 5362; 1910, 8918; 1914 (U. S. est.), 10,433; 1920, 10,669.

MOUNET, mōō'nâ', (JEAN) PAUL (1847–1922). A French actor, brother of Jean Mounet-Sully. He was born at Bergerac, Dordogne, became a doctor of medicine, and first appeared on the stage in *Horace* at the Paris Odéon (1880). It was in 1889 that he first played at the Comédie Française, of which he became sociétaire two years later. Mounet gained his reputation in *Les Erynnyes, L'Arlésienne, Othello, Patrie, Hamlet, La Furie, Anthony, Le Roi, L'Enigme, Le Dédale,* and *Œdipe Roi.* He served also as a professor at the Paris Conservatoire and became Chevalier of the Legion of Honor.

MOUNET-SULLY, sụ'lê', JEAN (real name, JEAN SULLY MOUNET) (1841–1916). A French tragedian. He was born at Bergerac and at 21 entered the Conservatoire. After beginning his career at the Odéon (1868) he served in the Franco-Prussian War and in 1872 made his début at the Théâtre Français. Admirably gifted by nature, he became famous for the power and passion of some of his impersonations. His successes were both in classic repertoire and in more modern plays: *Andromaque, Le Cid, Iphigénie, Phèdre, Zaïre, Hernani, Ruy Blas, Antigone, Othello, Marion Delorme.* Perhaps his most notable achievement, however, was his production of *Œdipe Roi* in the fêtes at the old Roman Theatre of Orange, a performance repeated in Paris at the Théâtre Français (1888) and some years later in New York. His Hamlet also counts among his most serious efforts. He wrote, with Barbier, the drama *La vieillesse de Don Juan* (1906), in which he assumed the title rôle. Consult Brander Matthews, *The Theatres of Paris* (New York, 1880).

MOUNIER, mōō'nyâ', JEAN JOSEPH (1758–1806). A French politician and author, born in Grenoble (Isère). He became judge at Grenoble in 1783, secretary of the estates of Dauphiné in 1788, and in 1789 was elected deputy to the States-General. There he unsuccessfully advocated the system of two legislative chambers, a subject which he also expounded in his *Considérations sur les gouvernements, et principalement sur celui qui convient à la France* (1789). He was elected President of the National Assembly in 1789, but soon afterward resigned because of the decision to remove the Assembly to Paris. He withdrew to Switzerland and thence to Weimar, published his *De l'influence attribuée aux philosophes, aux francs-maçons et aux illuminés, sur la révolution de France* (2d ed., 1828), and in 1801 returned to France, where Bonaparte appointed him Prefect of Ille-et-Vilaine (1802) and Councilor of State (1805). His further publications include *Recherches sur les causes qui ont empêché les Français de devenir libres* (1792). Consult De Lanzac de Laborie, *Un royaliste libéral en 1789: Jean Jos. Mounier* (Paris, 1887).

MOUNT, FOR GUNS. See COAST ARTILLERY; GUNS, NAVAL; ORDNANCE.

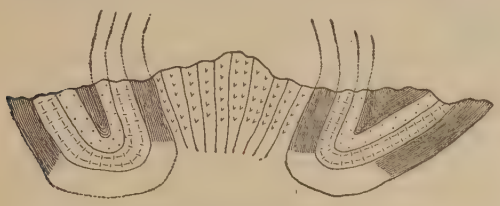
MOUNT, WILLIAM SIDNEY (1807–68). An American genre and portrait painter. He was born at Setauket, Long Island, and studied at the National Academy, New York, of which he was made a member in 1832. His first works to gain repute were the "Daughter of Jairus," exhibited in 1828, a full-length portrait of Bishop Onderdonk, and a number of clever children portraits. It was not until the exhibition of "Husking Corn" that his special talent for genre painting was recognized. Mount was the forerunner of a whole school of genre painters. His scenes are sympathetically composed and his figures well drawn and natural; he had a keen eye for humor and was one of the first Americans to portray the negro character successfully. Among his best paintings are: "Bargaining for a Horse," "The Fortune-Teller," and "The Truant Gamblers," all in the New York Historical Society; "Raffling for a Goose" (1837), Metropolitan Museum, New York; "A Long Story" (1837), Corcoran Gallery, Washington; "Coming to the Point," Public Library, New York.

MOUNTAIN (OF. *montaigne, muntaigne,* Fr. *montagne,* from ML. *montanea, montana,* mountain, from Lat. *montanus,* mountainous, from *mons,* mount). A term somewhat loosely used for a high prominence on the earth's surface with steep slopes. The distinction between mountain and hill is merely one of size. A plateau is distinguished from a mountain by its broader top and sometimes by its gentler slopes. Where a mountain forms a linear elevation it is called a range, ridge, chain, or sierra. Where the ridges are grouped in parallel lines, or *en échelon,* the groups are called mountain chains, systems, or cordilleras. These terms are sometimes given more precise meanings. *Mountain ridge* is sometimes confined to a series of parallel ranges, all of which were formed within a single geosyncline or on its borders. *Mountain system* is applied to a number of parallel or consecutive ranges formed in separate geosynclines of approximately similar dates of upheaval. *Mountain chain* is applied to two or more systems of the same general region of elevation, but of different dates of origin. *Cordillera* is applied to several mountain chains in the same part of the continent. Most of the names applied to parts of mountains explain themselves. Crest, peak, knob, pinnacle, needle, valley are familiar to all. A gorge or cañon or clove is distinguished from a valley by its steep slopes and narrow bottom; a park is a broad valley; a col or saddle is an exceptionally low point in a crest; a cirque is a steeply walled, outward facing amphitheatre near the crest of the range.

Types and Origin of Mountains. Mountains are formed (1) by uplift, (2) by circumdenudation or land sculpture, and (3) by eruptive agencies; and mountains formed in these three ways have characteristic and distinguishing forms.

1. By far the larger number of mountains due to uplift are in the form of folds or wrinkles in the earth's crust. These folds take

on a great variety of form and arrangement. Usually a number are parallel, but not coextensive in their longer directions, lapping by one another *en échelon*. They may be upright or overturned at various angles. They may be



FAN STRUCTURE, ALPS.

compressed along the limbs and spread out at the crest in such a way that the strata on both sides of the axial plane of the fold dip towards this plane, a type of folding called the fan fold, sometimes the Alpine structure, because of its excellent development in the Alps. On the major folds with this variety of attitude may be imposed smaller folds, just as smaller waves are superimposed on the greater waves of a body

SYMMETRICAL FOLD, JURA MOUNTAINS.

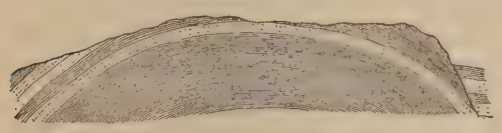
of water. Again, the folds are themselves folded in directions transverse to their longer directions. Examples of mountain systems representing folds of the earth's crust are the Alps, the Jura, the Appalachian system, the Coast Ranges, and most of the Rocky Mountains.

Another type of uplift is shown in the Basin Ranges of Nevada, Idaho, Arizona, and New Mexico and is known as the Basin Range structure. Here the uplift is not accompanied by

FAULTED STRUCTURE, BASIN RANGE.

any horizontal compression. The rocks apparently have been uplifted vertically in great blocks owing their outlines to joints or faults, while others remain stationary or go down. Not infrequently a series of such blocks is tilted in a monoclinal manner, corresponding edges of different blocks going up and the opposite edges going down, the elevated edges thus making mountains and the depressed edges valleys.

Still another type of uplift is shown in the Uinta Mountains of Utah, where a great mass of



BROAD ARCHED FOLD, UINTA MOUNTAINS.

rock has been lifted vertically above the adjacent rocks with only a gentle arching.

Two theories have been proposed to explain mountains of the fold type—the so-called gravitation theory and the contraction theory. It has been observed that mountains formed by folding or faulting are for the most part composed of great thicknesses of sediments which were deposited in the same general geosyncline, i.e., in the same great depression of the earth, or perhaps which were deposited in areas which became geosynclines owing to subsidence of the area under the weight of the sediments. It is supposed that the load of sediments may cause the isogeotherms to rise, i.e., causing the rocks at a certain level to have a higher temperature than they otherwise would have. This, perhaps combined with the injection of igneous rocks, which are sometimes observed to occur in such areas, causes the rocks to expand, resulting in folds or mountains. To this there are a number of objections. The expansion possible by this cause is not sufficient to explain the amount of folding observed, and furthermore it does not explain the occurrence of the folds in parallel ridges. The contraction theory is briefly this: The cooling of the earth is proceeding more rapidly in the interior than at the cool exterior. This causes more rapid contraction of the interior than of the exterior, and the crust, in its tendency to make itself smaller in order to fit the smaller nucleus, becomes wrinkled and corrugated. The wrinkles become located along points of weakness. These are likely to be under the geosynclines near the continental lands where great sedimentation has occurred, where, as above seen, the temperature is supposed to be higher.

2. When an area is elevated above the sea, the natural forces of erosion, wind, water, changes of temperature, etc., begin their attack upon the land and slowly cut it down, the waters collecting in rills, brooks, and rivers, cutting small and large valleys with a variety of forms and distribution due to the varying hardness and the structure of the materials cut through. If carried far enough, this process will ultimately bring the elevated area to sea level. At certain stages in the process certain areas, because of their hardness or structure, may stand high above the surrounding areas which have been worn away and may be called mountains. In so far as mountains have already been formed by folding and elevation, subsequent erosion only modifies their shapes; but where uplift has not left the land in mountain form, subsequent denudation may bring it into this point. Mountains formed or modified in this way have a variety of shapes. When the strata are horizontal, a hard layer at the top may resist erosion sufficiently long to make the mountain a flat or table-top mountain. Hard volcanic material about a volcano may resist erosion more than the surrounding material, and the area thus stand as a lava-topped mountain. The mesas and buttes of the Great Basin region of the United States illustrate the effects of erosion upon rocks of different hardness. If the strata are much folded, erosion cuts down along lines of least resistance, usually following the softer strata, leaving the edges of the harder ones as ridges. This state of affairs appears in the Appalachian system, a system owing its present features to folding and elevation combined with differential denudation along softer layers.

3. Mountains formed by eruption of igneous rocks are of common occurrence. Volcanic mountains formed by lavas occurring either singly or grouped in lines are well known. Vesuvius, Rainier, Hood, St. Helen's, Lassen,

and Shasta are examples of these. The volcanic materials may be so grouped as to form an upland of considerable extent, as the Cascade Range. Eruptions of igneous rocks which never reach the surface also form mountains by bulging up the strata above them. Going upward towards the surface they find it easier at a certain point to spread out in a globular form (called laccolite), arching the strata above them, than to break through the overlying strata and come to the surface. The mountain thus formed is a dome with a nucleus of igneous material, which latter may be afterward exposed to view by erosion along the crest of the arch. The Henry and Huerfano mountains of the western United States are of this type.

Mountains and Climate. Mountains fulfill important uses in the economy of nature, especially in connection with the water circulation of the world. They are at once the great collectors and distributors of water. In the passage of moisture-charged winds across them the moisture is precipitated as rain or snow. When mountain ranges intersect the course of constant winds and abstract the moisture, they produce a moist country on the windward side and a comparatively dry and arid one on the leeward. This is exemplified in the Andes, the precipitous western surface of which has a different aspect from the sloping eastern plain; and so also the greater supply of moisture on the southern sides of the Himalayas brings the snow line 5000 feet lower than on the northern side. Above a certain height the moisture falls as snow, and a range of snow-clad summits would form a more effectual separation between the plains on either side than would the widest ocean, were it not that transverse valleys are usually of frequent occurrence, which open up a pass, or way of transit, at a level below the snow line. Some ranges, like the Pyrenees and the Caucasus, are practically impassable except near their ends. Mountains also show considerable vertical variation in their life and climate zones. It is well known that, other things being equal, the air is one degree cooler for every 300 feet of ascent, and also that the rate of precipitation increases upward. At a certain elevation rain gives way to snow. Corresponding to these varying conditions of temperature and moisture is the distribution of the vegetation, which is commonly in well-defined zones, each zone distinguished by its species from the zones above and below. Near the top of many mountains the vegetation ends altogether, and the peaks are absolutely barren, the limit being reached more rapidly in cold than in warm climates.

Age of Mountains. The age of most folded mountain systems has been determined by the structure of the sediments of known age which compose them, and their relation to other sediments of known age. For instance, the Appalachian system of the eastern United States, composed mainly of Paleozoic rocks, is much contorted, while rocks of Mesozoic age rest against this mountain system in relatively undisturbed layers. It is clear that the main uplift of the mountain system followed the deposition of the Paleozoic rocks and preceded that of the Mesozoic rocks. The age of volcanic mountains is determined by the relations of the volcanic materials of surrounding sedimentary rocks of known age. The mountain systems of the world were formed at various times. Some of them have represented areas of weakness where several mountain-making movements have occurred, as in the Rockies, Pyrenees, Alps, Jura, and Himalayas. Others have been cut down by denudation to their very roots and do not now appear as mountains. The greatest and loftiest mountains of elevation have for the most part received their main uplift in comparatively recent geological times.

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MOUNTAIN, George Jehoshaphat (1789–1863). A Canadian Anglican bishop, son of Jacob Mountain. He was born in Norwich, England, was educated at Cambridge, and, having gone to Canada, was in 1813 ordained priest. After filling pastorates at Fredericton, N. B., and Quebec, he became Archdeacon of Quebec in 1821 and in 1836 Bishop, with the title of Bishop of Montreal. Shortly afterward the Bishop of Quebec retired, and Mountain took entire episcopal charge of the two provinces until 1839, when Upper Canada was made a separate see. In 1849–50 through his efforts the dioceses of Rupert's Land and Montreal were established, and he became Bishop of Quebec, retaining the position until his death. He founded the Church Society in Canada, and Bishop's College, Lennoxville. He published: *The Journal of the North-West American Mission* (1845; 2d ed., 1849); *Songs of the Wilderness* (1846), a book of poems; and several sermons. Consult A. W. Mountain, *A Memoir of George Jehoshaphat Mountain* (Montreal, 1866).

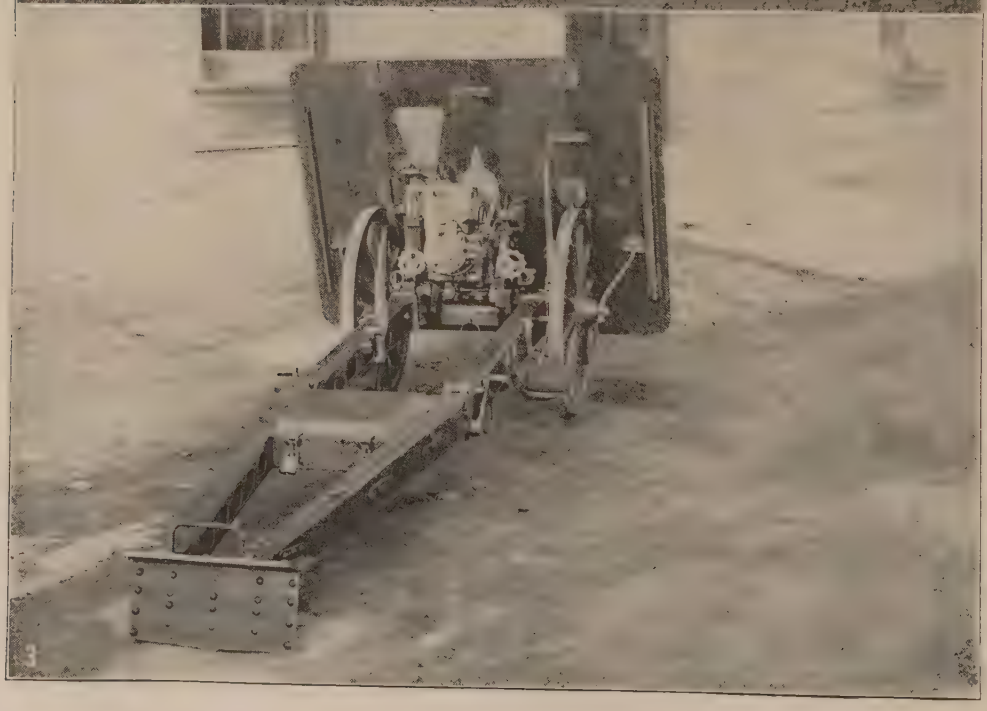
MOUNTAIN, Jacob (1750–1825). The first Protestant Bishop of Quebec. He was born in the County of Norfolk, England, was educated at Cambridge University, and was afterward ordained a priest of the Church of England. He held livings in Norfolk, Huntingdonshire, and Lincolnshire (1781–93) and in the latter year was made Bishop of Quebec. In 1792 Canada was divided into two provinces, Upper and Lower Canada. There were only six Anglican clergymen in the former province and three in the latter; but Mountain took episcopal charge of both provinces and by great energy and devotion during 32 years became the founder of the Anglican church in Canada. He built churches, extended missions, and also gave his services in a judicial and executive capacity at a time when the British régime was being organized in Lower Canada.

MOUNTAIN, The. The name of a political faction in the French Revolution. See Montagnards.

MOUNTAIN, or PACK, ARTILLERY. Field artillery in which the gun and all its equipment and ammunition are habitually transported on the backs of animals, instead of being drawn on wheeled carriages. The desirability of having a gun of large calibre (usually 3-inch)

UNITED STATES ARMY THREE-INCH MOUNTAIN HOWITZER PACKED ON MULES AND READY FOR THE FIELD

The five packs represent the distribution of the load of one gun



1. UNITED STATES ARMY MOUNTAIN BATTERY EQUIPPED FOR FIELD SERVICE

2. 2.95-INCH VICKERS MAXIM MOUNTAIN GUN (ENGLISH). Used in United States Army until replaced in 1915 by 3-inch Mountain Gun of Ordnance Department. Gun in action. Note wheels in the air

3. UNITED STATES ARMY 3-INCH HOWITZER. Rear view of carriage

available in difficult country inaccessible to wheeled transportation led to the invention and development of the modern mountain gun. The more accurately descriptive term is *pack* artillery, for the reason that such guns are frequently used in country which is not mountainous, but difficult from some other cause, e.g., on account of lack of trails, thick undergrowth, marshes, etc. Like all other field artillery, the mountain gun exists only for the support of infantry and cavalry. On account of its mobility, quietness, and relative invisibility as compared with wheeled carriages requiring six harnessed animals, mountain artillery is peculiarly fitted to advance with and coöperate in the close support of infantry lines. A single mountain gun, including its carriage and other equipment, is usually carried as five mule loads. (See illustration.) A mule with his load is not as high as a mounted man, and when led in single file, with extended distances, along ditches, beds of streams, behind hedges, etc., he is far more easily concealed than the light artillery carriage with its three hitched teams and mounted drivers. A packed mule can go anywhere a man can climb without using his hands. After the mule has reached his limit of mobility, his load may be removed, carried forward by four men, and the gun assembled on its small wheels and axle and dragged by hand to positions impossible to reach with other types of field guns. Although usually about the same calibre and using about the same weight projectile, the mountain gun, owing to weight limitations, is less powerful than the 3-inch light artillery gun.

A mule load should not much exceed 250 pounds, its length should not be over 4 feet, 6 inches. A gun weighing only 250 pounds is insufficient in power for modern requirements. For this reason the modern gun itself is usually divided into two loads, transported on two mules, and assembled upon unpacking. In several modern guns this division is made just behind the base of the cartridge, the breech ring and breech block being carried on the second mule. The number of mules required to transport a single complete gun, including its carriage and equipment, varies in different armies. The usual number, as in the United States, is five mules; in some other armies, three or four. In addition there are mules to carry the ammunition, baggage, grain, rations, etc. The men, with the exception of the officers and certain noncommissioned officers who are mounted, walk and lead the packed mules. The organization is like that for light artillery (q.v.), usually four guns to the battery, three batteries to the battalion, two battalions to the regiment. In the American service there are only six regiments of field artillery. Two of these, or one-third the total, are equipped with mountain guns. This proportion is much larger than that obtaining in other armies, but is no doubt maintained on account of the necessity for mountain guns in the American colonial possessions and for possible use in Mexico. The 3-inch United States mountain gun which was issued to the service in 1915 weighs about one-third as much as the corresponding 3-inch light field gun. Its initial velocity is 900 foot seconds as compared with 1700; weight of projectile 16 pounds as compared with 15; maximum range 5500 yards as compared with 6500. The angles of elevation and fall are much greater, the mountain gun being in fact a howitzer (q.v.). The gun and carriage are carried as five mule loads as follows: gun, cradle, top carriage and axle, trail, shields and wheels.

On the mountainous frontiers of northern Italy the Alpini, or frontier troops, organized to defend the passes, are supported by 36 mountain batteries. For similar reasons the Swiss army has a large number of mountain guns. Austria, surrounded by mountains, has given special attention to such guns. Her army has also a 30-pounder mountain howitzer, drawn on a narrow-gauge wheeled carriage and limber by three mules hitched tandem. When wheels cannot be used, the howitzer is dismounted and dragged on the trail, which is designed so as to be used as a sleigh.

In the European War of 1914 mountain artillery played an important part in the Carpathian Mountains and along the German and French Swiss frontiers. The Japanese frequently found them necessary in Manchuria during the Russo-Japanese War of 1904–05. Consult: United States War Office, *Drill Regulations, Mountain Artillery* (Washington, 1908); H. A. Bethell, *Modern Guns and Gunnery* (Woolwich, 1910); id., *Modern Artillery in the Field* (New York, 1911); Bond and McDonough, *Technique of Modern Tactics* (Menasha, Wis., 1913); H. G. Bishop, *Elements of Modern Field Artillery* (ib., 1914). See HOWITZER.

MOUNTAIN ASH. A coal-mining town and urban district in Glamorganshire, Wales, 5 miles south of Merthyr-Tydfil. It contains many fine buildings, including the town hall, the hospital, and the library institute and public hall. It has large collieries and foundries, owns its water and gas works, and maintains slaughterhouses. Pop., 1901, 31,093; 1911, 42,246.

MOUNTAIN ASH, ROWAN TREE, or QUICKEN TREE (*Pyrus aucuparia; Sorbus aucuparia* of many botanists). An ornamental European

MOUNTAIN ASH.

tree of the family Rosaceæ. It does not attain a great size; has in general a straight erect stem; and is distinguished from species of the other sections of *Pyrus* by pinnate glabrous leaves of serrated leaflets, terminated by a

single leaflet; corymbs of small flowers; and small globose fruit. The wood is valued for its compactness. The inner bark and sapwood have a peculiar odor. In the superstitions of European peasants a twig of rowan tree was supposed to have great efficacy in scaring away evil spirits. The generally red, sometimes yellow, fruit (rowan berries), which is acid and somewhat bitter, is sometimes used for preserves. The very nearly allied American species (*Pyrus americana*), which has bright-red fruit, is a shrub or small tree distributed from Newfoundland to Manitoba and southward in the mountains, and often planted as an ornamental. The wood is soft, light, and little used. Somewhat similar to it is the elder-leaved mountain ash (*Pyrus sitchensis*), a hardy species ranging north to Labrador and Alaska, but seldom found south of the Great Lakes region. It differs from *Pyrus americana* in its leaves, larger flowers, and fruits.

MOUNTAIN BEAVER. The sewellel (q.v.).

MOUNTAIN CAT. 1. In California, the cacomistle. 2. Any of several wild cats regarded as peculiar to local mountain regions; a catamount.

MOUNTAIN CHAIN. See MOUNTAIN.

MOUNTAIN CLIMBING. The awakening of man's interest in mountains is chiefly due to Rousseau, though earlier writers, while approaching them as scientists, were also susceptible to their charm. This twofold interest led Saussure to incite J. Balmat to find a way to the summit of Mont Blanc in 1786 and to accompany him thither in 1787. From that ascent alpinism is generally dated. In London in 1857 was formed the first alpine club to foster "the community of feeling amongst those who in the life of the High Alps have shared the same enjoyments, the same labors, and the same dangers." This idea, in a modified form, was taken up throughout continental Europe and advocated with such enthusiasm that doubtless 150,000 persons of both sexes are now enrolled in the various alpine societies. The largest of these are the German and Austrian (founded in 1862), about 98,000 members; Swiss (1863), 12,000; Italian (1863), 9036; and French (1874), 7000. In 1907, during the jubilee of the original alpine club, the Ladies Alpine Club was formed in London. In America several strong societies have come into being: the Appalachian Mountain Club (q.v.) in Boston (1876), 1800 members; the Sierra Club (1892) in San Francisco, 1900; the Mazamas (1894) in Portland, Oreg.; the Mountaineers in Seattle (1907), 500; and the Alpine Club of Canada (1906), 800. In these derivative societies eligibility is based upon a love of nature and of the mountain in particular rather than on alpinism proper, though most of them contain a contingent of expert climbers. The American Alpine Club (1902), 82 members, with its home in Philadelphia, reverts to the original type, but adds to its field polar exploration and the study of glaciers.

PRINCIPAL FIRST ASCENTS

NAME	Locality	Height	Year	Party
Mont Aiguille	Dauphiny	7,000	1492	Dompjulian de Beaupré
Pic du Midi	Pyrenees	9,547	15—	De Candale
Titlis *	Swiss Alps	10,627	1739	Anonymous
Mont Blanc †	" "	15,781	1786	Balmat and Paccard
Jungfrau	" "	13,672	1811	J. R. and H. Meyer
Finsteraarhorn	" "	14,026	1812	H. Meyer et al.
Monte Rosa ‡	" "	15,217	1855	Smyth et al.
Schreckhorn	" "	13,385	1861	Leslie Stephen
Weisshorn	" "	14,803	1861	J. Tyndall
Dent Blanche	" "	14,318	1862	E. S. Kennedy, C. Wigram
Matterhorn	" "	14,780	1865	E. Whymper et al.
Gross Glockner	Tyrolese Alps	12,457	1799	
Ortler†	" "	12,800	1804	Josele (a hunter)
Kasbek	Caucasus	16,546	1868	D. W. Freshfield et al.
Elbruz †	"	18,470	1868	" " "
Ushba	"	15,700	1888	J. G. Cockin
Dykhtau	"	17,000	1888	A. F. Mummery
Bride Peak	Himalayas	25,100	1909	Duke of the Abruzzi to 24,583§
Trisul	"	23,406	1907	T. Longstaff
Kabru	"	24,015	1883	W. W. Graham
Pioneer Peak	"	22,600	1892	W. M. Conway
Lungma	"	22,868	1903	Dr. W. H. and Mrs. Workman
Mount Cook†	New Zealand	13,349	1895	M. Zurbriggen (guide)
Chimborazo	Andes	20,498	1879	E. Whymper
Aconcagua	"	22,860	1897	S. Vines, Zurbriggen
Huascaran	"	21,812	1908	Annie S. Peck
Illimani	"	21,030	1898	W. M. Conway
Mount Washington †	White Mountains	6,293	1642	Darby Field
Pikes Peak	Rocky Mountains	14,147	1820	E. James et al.
Hood	Cascades	11,934	1854	Barlow et al.
Rainier	"	14,408	1870	Stevens and Van Trump
St. Elias	"	18,024	1897	Duke of the Abruzzi et al.
Sir Sandford †	Selkirks	11,590	1912	Palmer, Holway, et al.
Dawson	"	11,100	1899	C. E. Fay, H. C. Parker
Robson	Canadian Rockies	13,068	1909	Kinney and Phillips
Temple	" "	11,637	1894	S. E. Allen, W. D. Wilcox et al.
Assiniboine	" "	11,860	1901	J. Outram
McKinley	Alaska	20,464	1913	H. Stuck
Blackburn	"	16,140	1912	Dora Keen
Ruwenzori	Africa	16,744	1906	Duke of the Abruzzi

* The first snow peak.
‡ The highest summit.
† The highest in range.
§ The world's "record" climb.
In most instances the guides are not mentioned in this list.

Thus cultivated, Alpine climbing has attained almost to a science. Its principles are set forth in extended manuals, such as Dent's *Mountaineering*, Badminton Library (London, 1892). It

has called into existence the class of professional guides—Swiss, Tyrolese, and Italian—whose skill far exceeds that of the best amateurs. Their aid, always expedient in tours above snow lines, has until recently been regarded as indispensable in attacks upon giant peaks in distant lands, but the most recent conquests by American climbers in Alaska (Mounts McKinley and Blackburn) have been made without guides.

In England, especially, mountain climbing has from the beginning held a high rank among recognized sports and the Alpine Club has always numbered among its members many of the leading scientific, literary, and professional men of the nation, such as Tyndall, Lister, Stephen, and Bryce. Properly conducted it is not a dangerous sport, much as the unhappily large toll of lives annually sacrificed through rashness or inexperience would seem to argue to the contrary. These casualties usually occur in the Alps, to which the annual resort is very great, and have never attended the carefully planned ascents of the great peaks in more distant fields. Even in Switzerland it is true that disaster seldom if ever attends the ascent of the most difficult peaks such as the Gripon, the Charmoz, and the most difficult routes of the Matterhorn. Attempted only by experts, with the most experienced guides and only under the most favorable conditions, and conducted with unremitting care, the elements of risk are reduced to a minimum. The principal causes of accidents are avalanches, falling stones, breaking through cornices that overhang precipices below the summit arêtes or through snow bridges into concealed crevasses, or falls in attempting difficult crags or chimneys, often from the giving way of hand or foot holds—nearly all of which are avoidable.

Alpine ascents involve two quite different elements—snow and ice work and rock climbing. In both, the alpine rope and ice axe are indispensable aids, the former for binding together the members of the party (three is the ideal number), of whom in critical places but one moves at a time, the others being as firmly anchored as possible; the ice axe is used not merely for step cutting but also for varied service in rock climbing, as well as to replace the alpenstock. The firmness of foothold is increased by the use of various types of nails that stud the soles of the heavy waterproof boots and protect their edges from abrasion.

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MOUNTAIN CORK, or **MOUNTAIN LEATHER.** A fibrous and asbestos-like variety of amphibole (q.v.). See ASBESTOS.

MOUNTAIN CRANBERRY. See CRANBERRY.

MOUNTAIN DEVIL. See MOLOCH.

MOUNTAIN FINCH. See BRAMBLING.

MOUNTAIN GAZELLE. See GAZELLE.

MOUNTAIN GOAT. See ROCKY MOUNTAIN WHITE GOAT.

MOUNTAIN GREEN. See GLAUCONITE; GREEN EARTH.

MOUNTAIN GUN. See HOWITZER; MOUNTAIN ARTILLERY.

MOUNTAIN HERRING. The Rocky Mountain whitefish (*Coregonus williamsoni*), found in clear streams from the northern Rocky Mountain ranges to the Pacific coast. It is good food and is esteemed by anglers, as it readily takes a fly. See WHITEFISH, and Plate of WHITEFISH, SMELTS, ETC.

MOUNTAIN LAUREL. See KALMIA.

MOUNTAIN LEATHER. See ASBESTOS.

MOUNTAIN LIMESTONE. The basal strata of the Carboniferous series in the south of England and Wales. It is highly fossiliferous and carries a few ores. Its chief use is for building stone. The term was applied to the calcareous rocks of the American Subcarboniferous, but soon fell into disuse. See CARBONIFEROUS LIMESTONE.

MOUNTAIN LION. The name in the western part of the United States for the panther, cougar, or puma (*Felis concolor*, or *couguar*). Early writers upon America reported that the lion was a resident of North America from the skins they saw among the Indians, which they supposed to be those of lionesses. See PUMA; HUNTING BIG GAME.

MOUNTAIN MEADOWS MASSACRE. In American history, the massacre, by Indians, near Mountain Meadows in Utah on Sept. 11, 1857, of a party of emigrants from Arkansas and Missouri passing through Utah on their way to southern California. They numbered, all told, about 140 men, women, and children. On their way they were everywhere refused food until they reached the neighborhood of Mountain Meadows, a valley in Iron County, about 350 miles south of Salt Lake City. Here they stopped to rest their horses and on Sept. 7, 1857, were fired upon by Indians and, it is alleged, by Mormons disguised. They withstood siege until September 11, when, on promise of protection by John D. Lee (q.v.), Mormon Bishop and Indian agent, they left the shelter

of their wagons. All adults and children over seven years of age were killed, and 17 younger children were distributed among Mormon families, but were afterward restored to relatives by the United States government. The Mormons were accused of having instigated the massacre. Lee was executed for this crime in 1877, but a number of other indicted persons escaped conviction. In a confession made shortly before his execution Lee asserted that the massacre was committed by order of Brigham Young (q.v.) and others high in the Mormon church. H. H. Bancroft, in his *History of Utah*, discredits the confession, however, and lays the blame upon Lee and other minor fanatics. In his opinion Young was too astute to risk incurring the wrath of the American people by such an act. Consult *Confessions of John D. Lee* (St. Louis, 1891), and Linn, *Story of the Mormons* (New York, 1902).

MOUNTAIN MOCKING BIRD. See Mocking Bird.

MOUNTAIN PLANTS. The chief features of mountain plants have been discussed under the head of Alpine Plant. At the bases of most mountains the vegetation closely resembles that of the surrounding lowlands, but with elevation changes appear which correspond to the changes observed as the globe is traversed towards high latitudes. For example, in the mountains of Mexico the typical vegetation of the lowlands gives place with ascent to various zones of trees, including forms which are deciduous like those of the United States, then conifers like those of the northern United States and Canada, and finally into mosses and lichens characteristic of the alpine regions. Mountains contain a large proportion of endemic plants. This is doubtless due to their relative isolation. Mountain endemism is particularly characteristic of the alpine forms, probably because the conditions for their migration are less favorable than for those farther down. Some plants characteristic of mountain habitats are shown in the accompanying plate. See Endemism.

MOUNTAIN PLOVER. A ring plover (*Ægialitis montana*, or *Podasocys montanus*), very common throughout the Rocky Mountain region and neighboring plains, where its sandy gray plumage renders it almost invisible when it alights. It remains in the open lands and rarely ascends above the level (8000 to 9000 feet) of the interior parks. It breeds throughout its summer habitat.

MOUNTAIN QUAIL. A local name of two Californian partridges: (1) the plumed partridge (*Oreortyx picta*) and (2) Gambel's partridge (*Lophortyx gambeli*). See Ptarmigan; Quail; and Plate of Partridges.

MOUNTAIN SHEEP. The Rocky Mountain sheep. See Bighorn; Hunting Big Game.

MOUNTAIN SICKNESS, or Aviators' Disease. See Occupational Diseases.

MOUNTAIN SPINACH. See Orache.

MOUNTAIN SYSTEM. See Mountain.

MOUNTAIN TEA. See Gaultheria.

MOUNTAIN VILLAGE. An Eskimo settlement on the Yukon River, about 100 miles from its mouth. It has a Roman Catholic mission and a government school. The natives in 1913 owned 438 reindeer. Pop., 1915, about 300.

MOUNT AIRY. A city in Surry Co., N. C., 40 miles northwest of Winston-Salem, on the Southern and the Mount Airy and Eastern railroads (Map: North Carolina, B 1). Lumbering and the quarrying of granite constitute the chief industries. The electric light and power plant is owned by the city. Pop., 1900, 2680; 1910, 3844.

MOUNT ATHOS. See Athos.

MOUNT AUBURN. A well-known cemetery in Cambridge, Mass., containing the graves of many celebrated men, including Longfellow, Lowell, Charles Sumner, and Phillips Brooks.

MOUNT CAR'MEL. A mountain range of Palestine. See Carmel.

MOUNT CARMEL. A city and the county seat of Wabash Co., Ill., on the Wabash River, 35 miles northwest of Evansville, Ind., on the Cleveland, Cincinnati, Chicago, and St. Louis and the Southern railroads (Map: Illinois, J 9). The city contains a public library and attractive courthouse and high-school buildings. It is in a rich agricultural region. Besides railroad shops of the Big Four, there are manufactories of tomato catsup, ice, paper, strawboard, lumber, staves, and flour. Settled in 1818, Mount Carmel was chartered as a city in 1865. Pop., 1900, 4311; 1910, 6934.

MOUNT CARMEL. A borough in Northumberland Co., Pa., 71 miles northeast of Harrisburg, on the Northern Central, the Philadelphia and Reading, and the Lehigh Valley railroads (Map: Pennsylvania, J 5). There are extensive anthracite mining interests here and in the vicinity, and an important coal trade is carried on. The borough has also manufactures of miners' caps, cement blocks, cigars, shirts, stockings, etc., and large silk and planing mills, foundry and machine shops, a knitting mill, lumber yards, a packing plant, and wagon works. Pop., 1900, 13,179; 1910, 17,532; 1914 (U. S. est.), 19,386; 1920, 17,469.

MOUNT CAR'ROLL. A city and the county seat of Carroll Co., Ill., 128 miles west of Chicago, on the Chicago, Milwaukee, and St. Paul Railroad (Map: Illinois, E 1). It has a public high-school library, the Frances Shimer school for girls, a Carnegie library, and the Caroline Mark Home for Old Ladies. Though agriculture, dairying, and stock raising are the main interests, there are valuable lead and iron-ore deposits in the vicinity. The water works are owned by the city. Pop., 1900, 1965; 1910, 1759.

MOUNT CLEM'ENS. A city and the county seat of Macomb Co., Mich., 20 miles by rail northeast of Detroit, on the Clinton River, at the head of navigation, and on the Grand Trunk Railroad (Map: Michigan, G 6). It is a popular summer and health resort, beautifully situated, and noted for its mineral springs, which possess curative properties for many diseases. The city has a Carnegie library and well-equipped hotels and bathhouses. Its industrial interests are represented by a large beet-sugar factory, cooperage works, and establishments producing carriages, wagons, sleighs, automobile springs, bathtubs, typewriter cabinets, pottery, and agricultural implements. Settled in 1802, Mount Clemens was laid out in 1818 by Judge Christian Clemens and was incorporated first in 1878. The government is administered, under the conventional charter of Michigan cities of the fourth class, by a mayor, annually elected, and a unicameral council. The city owns and operates the water works. Pop., 1900, 6576; 1910, 7707.

MOUNT DESERT, dê-zẽrt' *or* dĕz'ẽrt. The largest of the many islands along the coast of

MOUNTAIN PLANTS

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1 ERODIUM PETRÆUM.
2 CAMPANULA PULLA.
3 DIANTHUS HIRTUS
4 GENTIANA ACAULIS.
5 PEDICULARIS ELONGATA.
6 LEUCOJUM VERNUM.
7 DAPHNE CNEORUM.
8 BULBOCODIUM RUTHENICUM.
9 SAXIFRAGA OPPOSITIFOLIA.

Maine. It is separated from the mainland on its northern end by Mount Desert Narrows (Map: Maine, D 4). A ridge of hills extends across the southern portion of the island, several of the peaks rising somewhat above 1000 feet. Numerous small bays and coves indent the coast, and there are many picturesque lakes and ponds. These lakes, with the rugged mountains and the bold cliffs along the coast, where there is much fine surf, furnish the inspiring and characteristic scenery which has made Mount Desert one of the most famous and attractive summer resorts on the Atlantic coast.

The principal harbors are Bar Harbor (so called on account of the bar which shows at low water between it and Bar Island, about ½ mile offshore), on the northwestern coast; Northeast Harbor and Southwest Harbor, at the entrance of Somes Sound; and Seal Cove, at the outlet of Seal Cove Pond—each with a village of the same name. Near the coast lie numerous islands, of which the largest are Bartlett, Swan, the Cranberry Isles, and Ironbound and several smaller islands off Bar Harbor. All of these islands are used as summer resorts. Mount Desert is connected with the mainland by a bridge across the Narrows (above referred to).

The principal village is Bar Harbor, an unincorporated settlement in Eden Township, with a population of about 2000, which is greatly augmented during the summer. It is on a branch of the Maine Central Railroad and is also served by steamship lines from New York, Boston, Portland, and other Atlantic coast ports. The ocean here is often too cold for bathing, even in summer; and a large open-air sea-water swimming pool serves as a substitute. The situation of the village is most picturesque, and there are a number of elaborately appointed hotels and many fine residences in the vicinity. There is a naval coaling station on the north shore of Eastern Bay, and Bar Harbor is frequently the rendezvous in summer of the North Atlantic squadron of the United States navy.

First discovered by Champlain, who gave the island its name, Mount Desert was settled in 1608 by French Jesuits, their colony of St. Sauveur on Somes Sound, however, being destroyed eight years later by an expedition from Virginia. A permanent settlement here was effected by the English in 1761. The town of Mount Desert was incorporated in 1789. Since that date the towns of Eden, Cranberry Isles, Tremont, and Southwest Harbor have been formed from the original district and incorporated, respectively, in 1796, 1830, 1848, and 1905. Pop.: Cranberry Isles, in 1910, 399; Eden, in 1910, 4441; Mount Desert, in 1900, 1569; Tremont, in 1910, 1116. Consult Street, *Mount Desert: A History* (Boston, 1905).

MOUNTED GRENADIERS. See INFANTRY, MOUNTED.

MOUNTED INFANTRY. See INFANTRY, MOUNTED.

MOUNTED POLICE. See MILITARY POLICE for description of various military and semi-military organizations of this nature; also POLICE.

MOUNTED RANGERS. See RANGERS, MOUNTED.

MOUNTED SERVICE SCHOOL. One of the 15 or more service schools maintained in the military educational system of the United States. It is located at Fort Riley, Kans., and includes the following subschools: the School of Equitation, the School of Farriers and Horseshoers, and the School of Bakers and Cooks.

The School of Equitation embraces four courses, viz., (*a*) the course for field officers; (*b*) the first-year course for company officers; (*c*) the second-year course for company officers; (*d*) the course in swordsmanship for noncommissioned officers. The object of the school is to give practical instruction in the following subjects:

In the course for field officers—In the methods of training the military horse as taught to company officers; in the use of the cavesson and longe; in advanced equitation of the officer; in correction of vices of the horse; in jumping; in cross-country work; in conditioning; modern breeds, crossbreeding, blood lines, conformation, and points of the horse. Duration of course, two months.

In the course for company officers—As indicated above for field officers and, in addition, hippology, horseshoeing, harness and transportation, forage, pioneer duties. The duration of the course is one year, except for 10 selected graduates of the first-year course, who are given an additional year's instruction in the most advanced work under the Saumur or French methods. Fifteen field officers and 36 company officers of cavalry and field artillery constitute the student classes. Officers of other branches of the service may be admitted upon the approval of the Secretary of War.

In the course in swordsmanship, cavalry noncommissioned officers alone are eligible—one from each regiment. The course is six months.

The School of Farriers and Horseshoers embraces two courses:

The course of instruction for enlisted men, farriers, is four months and includes the army horse in accident and disease, hospital work, first aid, bandages, treatment of wounds, sprains, bruises, abrasions, abscesses, operations, dissections, determination of age, conformation, defects, blemishes, lameness, and dispensary work. The course for enlisted men, horseshoers, includes actual work in the shoeing shop in all the departments of shoeing and of care of feet.

The School of Bakers and Cooks for enlisted men. Duration of course from three to five months. Includes practical instruction in all departments of cooking the government ration, baking bread, keeping accounts, and handling field bakeries in campaign. About 1600 pounds of bread are baked daily for the use of the garrison stationed at this post.

The personnel of the Mounted Service School consists of a commandant, who is a field officer, usually a colonel or lieutenant colonel of cavalry; the school staff; the Mounted Service School detachment; and the officers and enlisted men detailed as students. In addition to the personnel of the Mounted Service School there are stationed at Fort Riley, as a permanent garrison, a regiment of cavalry and a regiment of field artillery. The Field Artillery Board, formerly stationed at this post, has been transferred to Fort Sill, Okla., where the School of Fire for Field Artillery and the School of Musketry are now located. See FIELD ARTILLERY; SCHOOL OF FIRE FOR FIELD ARTILLERY; SCHOOL OF MUSKETRY; MILITARY EDUCATION.

MOUNT EVEREST. See EVEREST, MOUNT.

MOUNT'FORT, WILLIAM (?1664–92). An

English actor and playwright. As early as 1678 he was playing in London. After 1682 he was a member of the company at the Theatre Royal and was the creator of many parts in the drama of the time, besides writing and adapting several plays, such as *The Injur'd Lovers, or the Ambitious Father* (published 1688); *Successful Strangers* (1690); *King Edward the Third* (1691); *Greenwich Park* (1691). According to the common account of his death, he was assassinated Dec. 9, 1692, by Capt. Richard Hill, a jealous admirer of Mrs. Bracegirdle. Consult Cook, *Hours with the Players* (London, 1881), and Cibber, *Apology*, edited by Lowe (ib., 1889).

MOUNT HELICON. See HELICON.

MOUNT HOL'LY. A town and the county seat of Burlington Co., N. J., 20 miles east of Philadelphia, on Rancocas Creek and on the Pennsylvania Railroad (Map: New Jersey, C 3). It has the Burlington County Hospital, Children's Home, the Burlington County Lyceum of History and Natural Science, founded in 1876, which possesses a library of 6500 volumes, and several old Colonial buildings, including a Friends' meetinghouse, and a courthouse and jail. The industries are represented by several extensive shoe factories and by machine shops, foundries, canneries, a hosiery mill, leather-goods works, a curtain factory, etc. Pop., 1900, 5168; 1910, 5652.

MOUNT HOLYOKE (hōl'yōk) **COLLEGE.** An institution for the education of women at South Hadley, Mass. In 1837 Mount Holyoke Seminary was established by Mary Lyon (q.v.); from this grew Mount Holyoke College, which received its charter in 1888. In addition to the regular undergraduate courses, provision is made for graduate work, and special courses are open to teachers. The four years' course includes two years of prescribed and two years of elective work, leading to the degree of A.B. The college offers a large number of scholarships and four graduate fellowships. There were enrolled in all departments, in the collegiate year 1914–15, 796 students, with a faculty and staff of 114. Upon the college campus of more than 150 acres, attractively laid out, are built: 10 dormitories; Mary Lyon Hall, which occupies the site of the original building (destroyed by fire in 1896) and includes the chapel and offices of administration; a well-equipped gymnasium; an observatory; Lydia Shattuck Hall for chemistry and physics; Lyman Williston Hall for natural sciences; Dwight Memorial Art Building; a library of 56,000 volumes, with permanent fund of $25,000; a music building; the Skinner Recitation Hall; and the student alumnæ building—the latter two in process of construction in 1915. The student alumnæ building will contain a large auditorium and offices for the various student and alumnæ organizations. The productive funds of the college amounted in 1914 to $1,480,000, and its gross income was $344,000. Buildings and grounds are valued at $1,128,000 and the entire college property at $2,256,000. The president in 1915 was Miss Mary E. Woolley, A.M., LL.D., Litt.D., L.H.D.

MOUNT HOOD. See HOOD, MOUNT.

MOUNT HOOKER. See HOOKER, MOUNT.

MOUNT KENIA. See KENIA, MOUNT.

MOUNT KISCO. A village in Westchester Co., N. Y., 37 miles north of New York City, on the New York Central Railroad. It is in a fertile agricultural region and contains a fine public library, several fraternal organizations, and several beautiful estates and residences. The water works are owned and operated by the village. Pop., 1900, 1346; 1910, 2802.

MOUNT LEBANON. See LEBANON, MOUNT.

MOUNT LOGAN. See LOGAN, MOUNT.

MOUNT MANSFIELD. See MANSFIELD, MOUNT.

MOUNT MARCY. See MARCY, MOUNT.

MOUNT MOR'GAN. A municipality of Raglan Co., Queensland, Australia, 24 miles south-southwest of Rockhampton and 404 miles from Brisbane by rail (Map: Queensland, G 7). It is noted for the abundance and richness of the gold deposits found on the mountain summit and inclosed in a rock mass largely composed of iron ore and siliceous sinter. The yield of the Mount Morgan Mine (gold and copper) was, in 1911, $2,733,850. Pop., 1904, 6280; 1911, 7650.

MOUNT MORRIS. A village in Livingston Co., N. Y., 34 miles south by west of Rochester, on the Delaware, Lackawanna, and Western, the Erie, the Dansville, and Mount Morris, and the Pennsylvania railroads (Map: New York, C 5). Noteworthy features are the public library and post-office buildings and the picturesque Genesee River High Banks. There are also canning factories and municipally owned water works. Pop., 1900, 2410; 1910, 2782.

MOUNT MOTTARONE. See MOTTARONE, MOUNT.

MOUNT OF OLIVES. See OLIVES, MOUNT OF.

MOUNT OF OLIVES (*Christus am Oelberg*). An oratorio by Beethoven (q.v.), first produced in Vienna, April 5, 1803; in the United States, March 24, 1833 (Boston).

MOUNT OLIVE. A village in Macoupin Co., Ill., 43 miles northeast of St. Louis, Mo., on the Wabash, the Illinois Central, the Illinois Traction, and the Litchfield and Madison railroads (Map: Illinois, E 7). There are extensive coal mines, and flour milling and coal mining constitute the chief industries. The water works and electric-light plant are owned by the village. Pop., 1900, 2935; 1910, 3501.

MOUNT OLIVER. A borough in Allegheny Co., Pa., 2 miles from Pittsburgh, of which it is a residential suburb. Pop., 1910, 4241.

MOUNT OLYMPUS. See OLYMPUS.

MOUNT PARNASSUS. See PARNASSUS.

MOUNT PILATUS. See PILATUS.

MOUNT PLEASANT. A town and the county seat of Henry Co., Iowa, 28 miles west by north of Burlington, on the Chicago, Burlington, and Quincy Railroad (Map: Iowa, F 4). It is the seat of a State Hospital for the Insane, the Iowa Wesleyan College (Methodist Episcopal), opened in 1844, and was until 1911 the seat of the German College, opened in 1873. It has also several secondary institutions, a conservatory of music, and a public library. Mount Pleasant is the centre of a productive farming country and is an important shipping point for live stock, especially horses. There are grain elevators, repair shops, a planing mill, a brick and tile factory, a canning factory, etc. Limestone is extensively quarried in the vicinity. The water works and electric-light plant are owned by the municipality. Pop., 1900, 4109; 1910, 3874; 1915, 4078.

MOUNT PLEASANT. A city and the county seat of Isabella Co., Mich., 54 miles west by north of Saginaw, on the Chippewa River

and on the Ann Arbor and the Pere Marquette railroads (Map: Michigan, E 5). It is the seat of the Central State Normal School and of a United States Government Indian School and has a handsome courthouse. A fertile agricultural region surrounds the city, and there are manufactures of lumber and various lumber products, flour, woolen goods, plows, foundry products, brick and tile, wagons, condensed milk, etc. The water works are owned and operated by the municipality. Pop., 1900, 3662; 1910, 3972.

MOUNT PLEASANT. A town in Westchester Co., N. Y., 25 miles north of New York City, on the Hudson River and on the New York, New Haven, and Hartford Railroad (Map: New York, B 1). It is composed of the villages of North Tarrytown, Pleasantville, Sherman Park, and part of Briar Cliff Manor. Among the noteworthy features are the Westchester County Hospital, St. Joseph's Normal School, the Hebrew Sheltering Arms, the Dominican Fathers Home for Cripples, and the Cancer Hospital. Of interest in the vicinity are the Sleepy Hollow Cemetery, the old Dutch church, and the André Monument. The manufacture of automobiles constitutes the town's chief industry. Pop., 1900, 8698; 1910, 11,863.

MOUNT PLEASANT. A borough in Westmoreland Co., Pa., 69 miles by rail southeast of Pittsburgh, on the Baltimore and Ohio and the Pennsylvania railroads (Map: Pennsylvania, C 7). It is the seat of the Western Pennsylvania Classical and Scientific Institute (Baptist) and has a fine municipal building. The borough is the centre of an extensive coke-making industry and manufactures also flour, lumber, iron, foundry products, glass, etc. Pop., 1900, 4745; 1910, 5812.

MOUNT PLEASANT. A city and the county seat of Titus Co., Tex., 60 miles west by south of Texarkana, on the St. Louis Southwestern and the Paris and Mount Pleasant railroads (Map: Texas, E 3). It is in a productive cotton, corn, and trucking region and has a hardwood heading mill. Delwood Park and the Red Mineral Springs are worthy of note. There are municipal water works. Pop., 1910, 3137.

MOUNT RORAIMA. See RORAIMA, MOUNT.

MOUNT RUWENZORI. See RUWENZORI.

MOUNT SAINT MARY'S COLLEGE. A Roman Catholic college founded at Emmitsburg, Md., in 1808. It is controlled by a board of directors, of whom the Archbishop of Baltimore is president. The college has, in addition to the regular courses, a preparatory, a scientific, and a business course. The total enrollment in all departments in 1913–14 was 355 students and 27 instructors. A degree of A.B. only is conferred. The library contains about 20,000 volumes. The president in 1915 was Rt. Rev. Mgr. Bernard J. Bradley, A.M., LL.D.

MOUNT SHASTA. See SHASTA, MOUNT.

MOUNT SINAI. See SINAI.

MOUNT SINAI MANNA. See MANNA.

MOUNT STE'PHEN, GEORGE STEPHEN, first BARON (1829–1921). Canadian capitalist and railway promoter, born at Dufftown, Banffshire, Scotland. Going to Canada in 1850, he entered the dry-goods business in Montreal. He succeeded there as a cloth manufacturer and became wealthy. In 1876–81 he was president of the Bank of Montreal. Having been successful in railway operations in Minnesota and Manitoba, he later was conspicuous chiefly for his share in carrying through to completion the long-delayed Canadian Pacific Railway, of which he was president in 1881–87. For his services in this connection he was made Baronet by Queen Victoria (1886), and the following year he and Sir Donald Smith (afterward Lord Strathcona) gave $500,000 each for the building of the Royal Victoria Hospital, Montreal, in commemoration of her Majesty's jubilee. In 1888 he went to reside in England and in 1891 was created first Baron Mount Stephen, a title taken from a peak in the Rocky Mountains named for him during the construction of the Canadian Pacific Railroad.

MOUNT STERLING. A city and the county seat of Montgomery Co., Ky., 33 miles east of Lexington, on the Chesapeake and Ohio Railroad (Map: Kentucky, G 3). It has a public library and several private educational institutions. The city controls important tobacco and cattle interests, and among its industries are planing mills, flouring mills, machine shops, lunch-box and glove factories, and a distillery. Pop., 1900, 3561; 1910, 3932.

MOUNT TACOMA. See TACOMA, MOUNT.

MOUNT-TEMPLE, WILLIAM FRANCIS COWPER-TEMPLE, BARON (1811–88). An English politician, born in Hertfordshire. He studied at Eton and became an officer of the Royal Horse Guards. In 1835 he became secretary to his uncle, Lord Melbourne, who was then Prime Minister. He served in Parliament for Hertford from 1835 to 1863 and for South Hampshire from 1868 to 1880 and was Commissioner of Works in 1860–66. He inherited estates in Ireland from his stepfather, Lord Palmerston, in 1869 and then changed his surname to Cowper-Temple. In 1870 he introduced into the Education Bill the Cowper-Temple clause, which forbade religious instruction in rate-aided schools. He became Baron Mount-Temple in 1880.

MOUNT TOM. See TOM, MOUNT.

MOUNT UNION. A borough in Huntingdon Co., Pa., 45 miles southeast of Altoona, on the Juanita River and on the Pennsylvania and the East Broad Top railroads (Map: Pennsylvania, F 7). Its noteworthy features include Crum, Perduzzi, and Stratford blocks and the Mount Union Library. There are silica brickworks, a tanning and extract plant, coal yards, foundry and machine shops, and extensive manufactories of refractories. In the vicinity are found bituminous coal, a high grade of ganister rock, fire clay, and some timber. The water works are owned by the municipality. Pop., 1900, 1086; 1910, 3338.

MOUNT UNION COLLEGE. A coeducational institution for higher education founded at Alliance, Ohio, in 1846 as Mount Union Seminary and chartered as Mount Union College in 1858. It was the first institution in the United States to admit women to graduation on exact equality with men. In 1911 Scio College of Scio, Ohio, was consolidated with Mount Union College. The college included until 1915 an academy which in that year was discontinued. In addition to the college of liberal arts there is a conservatory of music, and a summer school is maintained. The total attendance in 1914–15 was 742, with 252 in the college, 352 in the conservatory, and the rest in the summer school. The college faculty numbered 19 and the instructors in the conservatory 15. The college campus includes 50 acres, with six buildings, a lake, two parks, and an athletic field. It has a pro-

ductive endowment of $286,000 and an annual income of about $35,000. The value of the buildings and grounds is about $223,000. The library contains about 16,000 volumes. The president in 1915 was Rev. M. C. McMaster, A.M.

MOUNT VERNON. The home and burial place of George Washington, in Fairfax Co., Va., on the right bank of the Potomac, 15 miles south of Washington, D. C. (Map: Virginia, G 3). The Washington mansion, beautifully situated on an eminence, commanding a view of the river, is of wood, two stories high, 96 feet long, and 30 feet deep. It was built in 1743 by Washington's elder brother, Lawrence, who called it Mount Vernon, after Admiral Vernon, under whom he had served in the British navy. A high piazza runs along the front of the house, which has six rooms of moderate size on the ground floor, containing many objects of historical interest. The plain brick tomb to which Washington's remains were removed from the old family vault in 1831 stands a few hundred yards from the house, near a wooded ravine. Mount Vernon, which had been much enlarged by Washington, was by him bequeathed to Bushrod Washington, upon whose death it came into the hands of John A. Washington, his nephew, who sold it in 1858 to the Ladies' Mount Vernon Association, which holds it in trust as a place of national interest. Consult: B. J. Lossing, *The Home of Washington and its Associations, Historical, Biographical, and Pictorial* (new ed., New York, 1865); Wineberger, *Home of Washington at Mount Vernon and its Associations* (Washington, 1866); T. N. Page, *Mount Vernon and its Preservation* (New York, 1910).

MOUNT VERNON. A city and the county seat of Jefferson Co., Ill., 76 miles by rail east by south of St. Louis, Mo., on the Louisville and Nashville, the Chicago and Eastern Illinois, the Southern, and the Wabash, Chester, and Western railroads (Map: Illinois, G 9). It has an attractive Supreme Court building, Carnegie library, and Highland Park and is engaged principally in agriculture, coal mining, and the manufacture of cars, machine-shop products, axe handles, lumber, flour, hosiery, catsup, cut glass, mattresses, etc. There are also a large grain elevator, knitting and canning factories, and a tie-preserving establishment. Pop., 1900, 5216; 1910, 8007.

MOUNT VERNON. A city and the county seat of Posey Co., Ind., 20 miles west by south of Evansville, on the Ohio River and on the Louisville and Nashville and the Chicago and Eastern Illinois railroads (Map: Indiana, B 9). It has a fine courthouse, a Carnegie library, and a handsome Soldiers and Sailors Monument. There are manufactories of flour, hominy, lumber, foundry and machine-shop products, engines, carriages, etc. Mount Vernon is a commercial centre of considerable importance for a fertile region in which corn and wheat are abundant. Pop., 1900, 5132; 1910, 5563.

MOUNT VERNON. A city in Westchester Co., N. Y., on Eastchester Creek, an arm of Long Island Sound, and the Bronx River and on the New York Central and Hudson River, the New York, Westchester, and Boston, and the New York, New Haven, and Hartford railroads (Map: New York, B 2). It is chiefly a residential suburb of New York City, which it adjoins on the north. It has more than 50 miles of well-paved and shaded streets and in the more elevated parts of the city, which command fine views of the Sound, there are costly mansions. Mount Vernon maintains a Carnegie library. Among the prominent edifices are the Lucas building, which contains the city offices, the Mount Vernon Hospital, Proctor Theatre building, the post office, and many churches and school buildings. There are manufactories of silver deposit, machinery, and clothing. Mount Vernon was founded in 1852, was incorporated as a village in the following year, and in 1892 was chartered as a city. The government, under the original charter, is vested in a mayor, elected every two years, and a municipal council. Pop., 1900, 21,228; 1910, 30,919; 1914 (U. S. est.), 35,047; 1920, 42,726.

MOUNT VERNON. A city and the county seat of Knox Co., Ohio, 25 miles north by west of Newark, on the Kokosing River, and on the Baltimore and Ohio and the Pennsylvania railroads (Map: Ohio, F 5). It has a fine courthouse, a public library, a large State tuberculosis sanitarium, and Hiawatha Park with a picturesque lake. There are locomotive, bridge, and Corliss-engine works, a large foundry, flour and saw mills, bent-wood works, and manufactories of furniture, glass, hoops, staves, sashes, and doors. The city is the centre of a fertile agricultural region, and near by are found natural gas and timber in abundance. The water works are owned by the municipality. Pop., 1900, 6633; 1910, 9087.

MOUNT WASHINGTON. See WASHINGTON, MOUNT.

MOUNT WHITNEY. See WHITNEY, MOUNT.

MOUNT WILSON SOLAR OBSERVATORY OF THE CARNEGIE INSTITUTION OF WASHINGTON. An astronomical observatory devoted to solar research and the study of stellar evolution. The computing offices, laboratories, and instrument shops are at Pasadena, Cal., while the telescopes and other apparatus for astronomical observations are at the summit of Mount Wilson (5886 feet), about 16 miles distant. The knowledge derived from the study of the sun, which is the only star sufficiently near the earth to be examined in detail, is applied to the interpretation of stellar phenomena, the chief object in view being to throw as much light as possible on the evolution of stars and the structure of the universe. An important phase of the work is the imitation of celestial phenomena in the Pasadena laboratories, which are equipped with a great variety of instruments for this purpose. The chief instruments on Mount Wilson include: (1) the Snow horizontal telescope, used daily for photographing the sun, both directly and with the spectroheliograph, which records the invisible clouds of calcium vapor and hydrogen gas in its atmosphere; (2) the 60-foot tower telescope, with 30-foot spectograph and spectroheliograph, used chiefly for the study of the pressure and motions of gases at various levels in the solar atmosphere; (3) the 150-foot tower telescope, with 75-foot spectrograph and spectroheliograph, mainly employed for the investigation of the magnetic phenomena of sun spots and of the sun as a whole; (4) the 60-inch reflecting telescope, devoted to the photography, both direct and spectroscopic, of stars and nebulæ; (5) the 100-inch reflecting telescope (not yet completed), which will also be used for stellar research. For a popular account of the purposes and work of the observatory, consult *Ten Years' Work of a Mountain Observatory*,

MOUNT VERNON

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MOURNING BRIDE, The. A play by William Congreve (1697). The play is the source of the famous lines beginning, "Music hath charms to soothe the savage breast."

MOURNING CLOAK. A handsome butterfly (*Euvanessa*, or *Vanessa, antiopa*), known in England as the Camberwell beauty. It appears

THE MOURNING CLOAK.

in the United States very early in the spring and may not infrequently be seen flying about on warm days in winter. It hibernates in the adult stage even in cold climates. According to Scudder it ranges from the Arctic circle to the thirtieth parallel of latitude. It is purplish brown, with wings bordered by yellow, brown, and blue. The larvæ are covered with black spines and feed gregariously on willow, elm, poplar, and hackberry, often stripping the larger branches of leaves. The species is two-brooded, and the second generation of moths appears in midsummer.

MOURNING DOVE. The Carolina dove. See Dove.

MOUROMTSEV, Sergei. See Muromtsev, S. A.

MOURZOUK, mo͝or-zo͝ok′. A town of Africa. See Murzuk.

MOUSCRON, mo͝os′krôn′. A town of Belgium in the Province of West Flanders, situated near the French frontier, 32 miles southwest of Ghent (Map: Belgium, B 4). It is a customs station, has an episcopal college, and manufactures furniture and cotton and woolen goods. Pop., 1900, 19,366; 1910, 22,188.

MOUSE (AS., OHG. *mūs*, Ger. *Maus*, Lat. *mus*, Gk. *μῦς*, *mys*, OChurch Slav. *myshi*, Skt. *mūṣa*, mouse, from *mus*, to steal). The word "mouse" was originally applied to a small rodent mammal, *Mus musculus*, now called the house mouse, which was formerly confined to the Old World, but is now cosmopolitan in its distribution. Gradually the use of the word has extended to other small rodents, and especially in compounds to mammals not rodents, and even to birds. This troublesome little rodent is a small gray creature, with a body about 3 inches long and a tail half that length, the ears rather large and very delicate, and small feet. The color shows considerable variation, in some cases having a strong brown cast, while in others it becomes very pale and even fades to white. In its habits the mouse is largely nocturnal, though often seen during the day. It makes its home in sheltered nooks and crannies, where a nest of rags, paper, feathers, etc., is nicely made. Mice are very prolific, 6 to 10 young being born at a time, and there are many broods during the year. Much has been written about the singing powers of the mouse, and the fact that it does sing is supported by the evidence of perfectly trustworthy witnesses. Mice are unquestionably fond of music, but it is not fully determined whether their ability to make it is normal or is an individual peculiarity. Some writers have gone so far as to assert that it is due only to a diseased throat.

The name "mouse" is applied to any representative of the genus *Mus* not big enough to call a rat. This genus is one of the largest of mammalian genera, although recently there is a tendency to split the group into several. It has been usually defined as including upward of 130 species, which vary considerably in size, somewhat in color, and not a little in the softness of the pelage. The upper molar teeth are always wide, with three series of tubercles, and therefore called trituberculate; in this respect *Mus* differs from all of the native American rats and mice. Another characteristic of the genus is the long, slender, rounded tail, with whorls of scales, and few hairs; in some mice this is almost prehensile. Besides the common mouse the following may be mentioned as well-known European species: the wood mouse (*Mus*, or *Apodemus, sylvaticus*), which is a trifle larger than its cosmopolitan cousin, and on account of its longer tail is sometimes called the long-tailed field mouse; it is abundant in Great Britain and is noted for the large stores of grain which it hoards. The harvest mouse (*Mus*, or *Micromys, minutus*) is the smallest of British quadrupeds, the length exclusive of tail being only about 2½ inches; it occurs chiefly in the southern parts of England and is notable for its curious globular nest, composed of grass leaves and panicles woven together and suspended between stalks of grain or tall grass; a somewhat smaller species (*Mus*, or *Micromys, pumilus*) occurs in the south of Europe. Asia and Africa have many species, as the curious black-striped Barbary mouse, which looks like a miniature American ground squirrel.

In America the name "mouse" is applied to a large number of small mammals, especially in such compounds as wood mouse, field mouse, etc. Some of these are very different from the true mice, but nearly all belong to the family Muridæ, though not to the Murinæ with the Old World mice. Many of them are voles, of the subfamily Microtinæ, while others are vesper mice or white-footed mice of the subfamily Cricetinæ, to which the hamsters also belong. A typical American example of this latter group is the well-known and widely distributed white-footed mouse or deer mouse (*Peromyscus leucopus*), which is found, in some one of many local races, nearly throughout North America. It is about 7 inches long, of which nearly one-half is the tail. The upper surface is fawn color of some shade, while the under parts and the feet are snowy white. The ears are rather large, and the general form and appearance delicate and graceful. It is found in all sorts of situations and even lives in houses sometimes, like the common mouse. In the Central and Southern States another species even handsomer than this occurs, known as the golden mouse (*Peromyscus aureolus*). It is golden cinnamon above and yellowish white beneath. The largest and in some respects the most remarkable of this group is the rice-field mouse (*Oryzomys palustris*), which is 10 or 11 inches long, dark grizzly rat color, and has very harsh pelage. It is said to be more

like the true mice than any other American species. The curious little harvest mouse (*Ochetodon*, or *Reithrodontomys, humilis*) of the Southern States is one of the smallest of American quadrupeds, being only 4 inches long, and half of that is tail. More detailed information will be found under the names of these and other mice, as JUMPING MOUSE, MEADOW MOUSE, ETC. See also accompanying Plate of MICE AND JERBOAS.

Consult authorities cited under MAMMALIA.

MOUSE, FLYING. See FLYING PHALANGER.

MOUSE BIRD. Any bird of the African genus *Colius* and family Coliidæ; a coly. These birds have soft gray and white plumage, conical brightly colored bills, and long and narrow central tail feathers, and take their name not only from their ashy plumage, but from their mouse-like activity in scrambling about the branches of trees, where they hang head downward (even sleeping that way), and swing and twist like acrobats. They are enabled to do this by the striking peculiarity of structure in the feet, which have all four toes turned forward. They are fruit eaters, go about in small bands, but fly poorly, and build their nests in dense shrubs. See Plate of KINGFISHERS, MOTMOTS, ETC.

MOUSE DEER. See CHEVROTAIN.

MOUSE-EAR CHICKWEED (*Cerastium*). A genus of numerous species of plants of the family Caryophyllaceæ, natives of temperate and cold countries throughout the world. Some of them are among common weeds; others, having larger flowers, are occasionally planted in flower borders and on rockwork. The form and hairiness of the leaves of some species have given rise to the popular name.

MOUSE FISH. One of the tropical frogfishes (*Pterophryne histrio*), common in the Gulf of Mexico, the colors of which are highly variable. It is related to the anglers (see ANGLER), and its bait is its first dorsal spine, which is bifurcate. The fact that it is frequently found in the fields of sargasso weed of the Atlantic gives it a second name, sargassum fish.

MOUSE LEMUR. A very small woolly lemur of Madagascar, nocturnal and mouselike in its appearance and habits. It is a member of the genus *Chirogaleus*. Five species are recognized. See CHIROGALE; LEMUR; Plate of LEMURS.

MOUSE TOWER. A tower built on a rock in the middle of the Rhine near Bingen. According to popular tradition, it was hastily erected by Archbishop Hatto I of Mainz (q.v.) as a refuge from the swarms of mice sent to devour him in punishment for his cruelty to the poor, whom he burned in a granary during a famine. The German name Mäuseturm is probably a popular corruption of Mautturm, toll tower, for which the structure appears to have been originally intended, and the legend was built about the name. According to some authorities, the building was a watch tower, and the name is referred to Old German *musen*, to spy. It is now used as a signaling station for steamers.

MOUSTERIAN (mōō-stē'rĭ-an) **EPOCH.** See PALEOLITHIC PERIOD.

MOUTH (AS. *mūþ*, Goth. *munþs*, OHG. *mund*, Ger. *Mund*, mouth; connected with Lat. *mentum*, chin, and ultimately with Skt. *mukha*, face). In an animal, the opening through which food enters the body. Not all animals have mouths, for certain parasitic forms, notably the tapeworm, lack a system for digesting food, and consequently no opening for its entrance is necessary; in such cases the food is absorbed through the surface of the animal. The simplest form of mouth is that which occurs in the Protozoa, where the food is taken into the body through a special opening, which is fairly constant in position and may be surrounded with cilia, sometimes long. Many Protozoa, as well as sponges, have no mouth in any true sense, as the food may be taken in at any part of the body surface, and therefore the opening has no fixed position and no regular size or form. The mouth of corals, jellyfish, sea anemones, and other cœlenterates is simply an opening, almost always central in position, on the lower surface in free-swimming forms, on the upper surface in fixed forms. It is usually circular, but may be flattened, and in one group of jellyfish it is divided up into four or more, sometimes innumerable, small openings, by the growing together of the lobes on its margin. In the flatworms the mouth is usually circular and is often in the centre of a sucker, but its position is variable, though it is always on the ventral side. It may be near the anterior end of the animal, but it is more often at the centre and is sometimes posterior. Among the various classes of worms the mouth is always anterior, and often terminal, though more often on the lower side of one of the first segments or, in unsegmented forms, in a similar position. In bloodsuckers it lies in the centre of a powerful sucker, and is provided with three chitinous jaws; in vegetable-eating and some carnivorous forms (nemertines) it is a simple opening without jaws, while in such active carnivorous worms as *Nereis* it is provided with powerful jaws. These jaws, however, are clearly modified segmental appendages, and are practically feet which have become modified to assist in seizing food or forcing it into the mouth. In the crustaceans, insects, spiders, and the like (arthropods) the mouth is more or less terminal and is provided with lateral jaws; sometimes as many as eight pairs of appendages are modified to serve for this purpose. The structure and arrangement of the mouth parts in insects are very complicated and are of great importance in classification. Roughly they may be grouped as *biting*, when there are freely movable lateral jaws which seize and cut or tear the food; *piercing*, when the various parts are more or less united to form a sharp, piercing instrument, which penetrates animal or plant membranes in search of the fluid food, which is then sucked; *sucking*, when the parts are united to form a suctorial tube, with no adaptation for piercing.

Among echinoderms the mouth shows considerable variety of form. In mollusks the mouth is generally anterior and often ventral, but it is frequently terminal. In the devilfish, squids, and the like, it is in the centre of the foot. In the clams and other lamellibranchs there are special organs of sense, known as labial palps, on each side of the mouth, but there is no tongue, while in all other mollusks a tongue covered with teeth and known as the radula is present. The cephalopods (squids and the like) have powerful jaws, arranged like the beak of a parrot, but in all other mollusks the jaws are small and rather weak, sometimes three in number, or they may be wholly wanting, as in the lamellibranchs.

In the vertebrates we find the formation of the mouth is used by some writers to divide them into two contrasted groups, the *cyclostomes*

MICE AND JERBOAS

1. AMERICAN JUMPING MOUSE (Zapus Hudsonius).
2. EGYPTIAN JERBOA (Dipus Ægypticus).
3. YARKAND JERBOA (Euchoreutes naso).
4. KIRGHIZ JERBOA (Alactaga decumana).
5. BARBARY STRIPED MOUSE (Mus Barbarus).
6. HOUSE-MOUSE (Mus musculus).
7. HARVEST-MOUSE (Mus minutus).
8. MEADOW-MOUSE (Microtus Pennsylvanicus).

or round mouths and the *gnathostomes* or jaw mouths. The round mouths include only three or four genera, and are characterized by the absence of jaws, the mouth serving as a sucking organ. The surface of this mouth sucker bears characteristic horny teeth. All the other vertebrates are gnathostomes, provided with vertically moving upper and lower jaws, one or both of which, except in birds, turtles, and some whales, bear teeth. There are also a tongue and various glands, notably the salivary glands. True lips, provided with muscles, are characteristic of mammals, but are also found in dipnoid fishes. In many mammals the sides of the buccal cavity—i.e., the space outside the jaws—are enlarged to form cheek pouches, of use as food reservoirs. The origin of the vertebrate mouth has been a matter of much discussion and is closely associated with the still more fundamental question of the origin of the skull. Apparently, however, the jaws arise as modifications of the first branchial arch, which becomes divided into two parts, the proximal giving rise to the quadrate bone, which gives rise to an anterior process, forming a sort of primary upper jaw; the distal part is the cartilage of Meckel, the basis of the lower jaw.

See ALIMENTARY SYSTEM; GLAND; SKULL; TEETH; TONGUE.

MOUTH, DISEASES OF THE. From its situation at the portal of the digestive tract, the mucous membrane lining this cavity is peculiarly exposed to many forms of irritation and infection. The following are the principal forms of inflammation of the mouth, or *stomatitis* (Gk. *στόμα, stoma,* the mouth), as it is termed by nosologists:

1. *Acute catarrhal stomatitis,* which may extend over the mouth, including the tongue, or may occur in limited areas, is seen in children, associated with dentition or gastrointestinal disturbances, and in adults following excessive smoking or the taking of hot or too highly seasoned food. It is a frequent concomitant of indigestion and febrile diseases, but is more commonly a complication of other diseases than an original affection. In ordinary cases a simple mouth wash composed of a solution of borax and honey, and gentle catharsis, will effect a rapid cure.

2. *Parasitic stomatitis,* a diffuse inflammation with the formation of patches of false membrane, is caused by a fungus—the *Saccharomyces albicans,* also known as *Oidium albicans.* It occurs most commonly in young children, and is described under its popular name, THRUSH.

3. *Aphthous stomatitis,* also known as herpetic, follicular, or vesicular stomatitis, is an inflammation of the follicles of the mucous membrane and is described in the article APHTHÆ.

4. *Ulcerative stomatitis,* sometimes called *fetid* stomatitis, or putrid sore mouth, generally occurs in children after the first dentition and is associated with defective hygienic and sanitary conditions. The ulcerative process begins usually at the margin of the gums and extends along the gum lines of the jaws. The bases of the ulcers are covered with a grayish-white adherent membrane. The swelling of the adjacent parts is often so considerable as to be apparent externally. There is a copious flow of saliva, and the breath is very offensive. The ulceration may continue for weeks, or even months, but always yields to treatment. The febrile symptoms and the constipation which are usually present must be combated in the ordinary way. Perhaps the best general method of treating the disease is by the administration of small doses of chlorate of potash and by frequently washing the mouth with a weak solution of the same drug, or of borax, sodium salicylate, or hydrogen peroxide.

5. *Gangrenous stomatitis, cancrum oris,* or *noma,* is the most severe form of stomatitis and occurs as a rule in feeble children between two and five years old during convalescence from the acute fevers. It occurs frequently in institutions, is believed to be mildly contagious, and is associated with the presence of Vincent's microörganisms. The disease is characterized by a rapidly progressing gangrene, beginning on the cheeks or gums, resulting in extensive destruction of the soft tissues, at times even invading the jawbones and ears. The constitutional disturbance is great and the prostration extreme, and the case usually terminates in death. Treatment is unsatisfactory. Early destruction of the ulcer by the cautery, careful nourishment, and free stimulation may arrest the disease. Salvarsan (q.v.) has been suggested as a remedy.

6. *Mercurial stomatitis* and other diseases of the mouth are noticed in the articles GUMS, DISEASE OF; RANULA; SALIVATION; SCURVY; THRUSH; TONGUE; TUMOR (for cancer). Consult J. S. Marshall, *Mouth Hygiene and Mouth Sepsis* (Philadelphia, 1912), and Broomell and Fischelis, *Anatomy and Histology of the Mouth and Teeth* (4th ed., ib., 1913).

MOUTON, mōō-tŏn′, ALEXANDER (1804–85). An American politician, born in what is now Lafayette Parish, La. He graduated at Georgetown College (District of Columbia), studied law, and was admitted to the bar in 1825. In 1826 he was elected to the Lower House of the Legislature and was Speaker in 1831–32. He was a presidential elector in 1828, 1832, and 1836, and in 1837 was elected to the United States Senate. He resigned in 1842 to accept the nomination for Governor of Louisiana, was elected, and served from 1843 till the adoption of the new constitution in 1846. He was president of the Southwestern Railway Convention in 1853 and a delegate to the National Democratic Conventions in 1856 and 1860. In 1861 he presided over the Louisiana convention called to consider the question of seceding from the Union. In the latter part of the same year he was a candidate for the Confederate Senate, but failed to be elected and then retired to his plantation, where he spent the remainder of his life.

MOUTON, mōō′tôn′, GEORGES. See LOBAU, COUNT DE.

MOVABLES (OF. *movable, mouvable,* Fr. *mouvable,* from Lat. *movere,* to move). Such subjects of property as can be moved or transported from one place to another. The term is used as contradistinguished from things immovable, as lands and chattels which have become definitely and permanently attached to land as fixtures. The terms "movable" and "immovables" are sometimes inaccurately employed as identical in meaning with personal and real property, respectively. While most movable chattels are personal property, some, as heirlooms, are classed as real property, and many important estates or interests in land, as mortgages and leaseholds, are classed as personal property. Moreover, there are many

kinds of property, of an intangible or incorporeal character, to which the terms "movable" and "immovable" are wholly inapplicable, such as debts and other choses in action, patent rights, copyrights, shares of stock in corporations, annuities, titles of honor, etc. These are variously classified as real or personal property.

In Scots law the word "movables" is used as contradistinguished from heritable property, and is practically synonymous with personal property in American and English law. See CHATTEL; PERSONAL PROPERTY; REAL PROPERTY.

MOVEMENT. Several modes of movement are manifested in plants and plant organs. Some of the lower forms (bacteria, algæ, and fungi) exhibit movements of locomotion in certain stages, swimming freely in the water in which they are found. The same is true of the zoöspores and conjugating sexual cells (gametes) of many plants which themselves are not motile. Also, the plasmodia of slime molds show a peculiar flowing of the protoplasm which results in motion from one place on the substratum to another. This is called amœboid movement. (For directive locomotor movements see CHEMOTAXIS; PHOTOTAXIS; TAXIS; ETC.) Another kind of movement often met with in plants is the so-called hygroscopic movement. This is shown by the awns of certain grasses and other fruits (seeds) (Fig. 1), by the valves of many seed pods (Fig. 2), by the teeth of the peristome of moss capsules, and by the elaters of liverworts, horsetails, (*Equisetum*), etc. It is a phenomenon having no connection whatever with the vitality of the parts, being due merely to unequal swelling or shrinkage (i.e., warping) of the different tissues by reason of their unequal absorption or loss of water; and this depends on the unlike composition of the material of the cell walls.

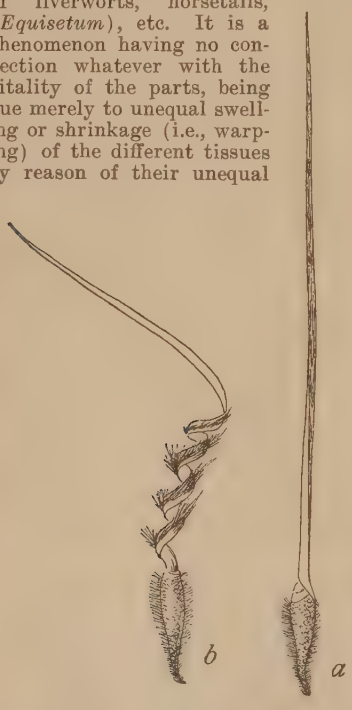

FIG. 1. FRUIT OF ERODIUM GRUINUM.

a, when wet; *b*, when dry; the straightening of *b* when tip is caught in grass and the awn absorbs moisture bores the seed-containing lower part into the soil and so plants it.

From a physiological point of view perhaps the most important form of plant movement is that exhibited by the leaves of the so-called sensitive plants. The best example of this is found in the mimosa of greenhouses. When this plant

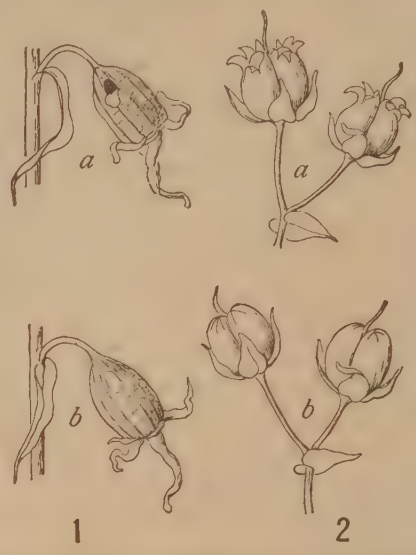

FIG. 2. HYGROSCOPIC MOVEMENTS OF THE VALVES OF SEED PODS.

1, *Campanula ranunculoides: a*, when dry; *b*, when wet. 2, *Linaria macedonica: a*, when dry; *b*, when wet.

is jarred, struck, locally burned, or injured otherwise, its leaves suddenly collapse, even those at a distance from the shock. Its leaves are doubly compound, and in closing the pinnules rise so that the upper faces of opposite ones are brought together, the pinnæ drop downward and forward, while the whole leaf sinks (Fig. 3). If a shock be given to one pinnule, the disturbance there set up, if severe enough, is propagated to other parts of the same leaf and

FIG. 3. LEAF OF THE SENSITIVE PLANT (*Mimosa*).

a, in light when undisturbed; *b*, after shaking.

even to other leaves. Almost any portion of the plant can receive a stimulus in this way and pass it on to other regions. The organs which execute the visible response are motor organs (see MOTOR ORGAN), cushions of tissue (pulvini) situated one at the base of the leaf, of each

pinna, and of each pinnule. Indigenous plants which show this reaction, though not so strikingly, are the common oxalis and different species of *Cassia*.

The so-called "sleep movements" of leaves of the pea family, *Oxalis*, etc., are executed by the same motor organs, which, however, are often less perfectly developed. These movements consist of changes in the position of the leaf following variations in the intensity of illumination, so that these leaves have a nocturnal and a diurnal position. Hence the misleading expression "sleep movements."

For a discussion of the variety of movements of plants in response to stimulation, which are brought about by unequal growth on opposite sides of an organ, see CHEMOTROPISM; ELECTROTROPISM; GEOTROPISM IN PLANTS; HELIOTROPISM; RHEOTROPISM; THERMOTROPISM. See also LOCOMOTION; MYXOMYCETES; ROTATION; SLEEP OF PLANTS.

MOVEMENT. A musical term denoting a division of a cyclical composition. As early as the sixteenth century a number of dances were loosely joined together, the only rule followed being that all should be in the same key and that the tempo (fast, slow) should alternate. This gave rise to the suite (q.v.), but the modern symphony or sonata was developed from the old overture, which consisted of three parts, a fast one followed by a slow one with the first part repeated. Gradually the three parts were separated and became distinct movements. In the sonata the first movement is always written in a particular form called sonata form. The different movements are in different (but related) keys. The first and last are always in the same key, which is therefore spoken of as the key of the cyclical composition. When the first movement is in the minor, the last is generally in the relative major. Each movement has its own themes. Occasionally, however, a composer introduces in a later movement (generally the finale) a theme from a former movement. The number of movements depends upon the character of the composition. In works written in sonata form the usual number is three for sonatas and four for symphonies. In suites the number varies from four to eight. See FORM; OVERTURE; SONATA; SUITE; SYMPHONY.

MOVEMENT, PERCEPTION OF. We may perceive movements of a part of the body, movements on the surface of the body, and movements of objects in space; i.e., we may have kinæsthetic, cutaneous, and visual perceptions of movement. Psychologically, movement is a composite perception made up of spatial and temporal perceptions. (See DURATION; EXTENSION; LOCALITY.) When we perceive an object as moving, it occupies different positions in space during a certain time. But the characteristic thing about the perception of movement is that there is no successive localization of an object, with temporal pauses between; the object is perceived as changing its position continuously; and it is the continuity of movement, therefore, that first offers itself for explanation. It has been held that the sensory basis of continuity is to be found in the positive afterimage. (See AFTERIMAGES.) Since sensation continues for a time after the cessation of stimulus, the gap between the sensations set up at the beginning and end of the movement is thus filled in; and changes in the intensity of the afterimage, aided by cortical disposition, furnish the necessary clews for the perception. In the cutaneous and kinæsthetic fields this theory seems adequate to the facts; but in the case of visual movement there are difficulties. It is well known that, if discrete phases of some objective movement be thrown upon the retina in rapid succession, by an instrument like the stroboscope or the moving-picture machine, the perception of movement will result. This illusion was formerly explained by reference to the positive afterimage; but recent experiments discredit that theory completely by showing that perceptions of movement may be obtained from nonmoving objects. If, e.g., a short vertical line is drawn at the end, and a short horizontal line at the middle, of a stroboscopic strip, and if the strip is revolved slowly in the cylinder, the two lines appear, successively, as discrete objects; if revolved rapidly, the two lines appear as a right angle; but if it is turned at a rate between these two extremes, the lines are seen to move, the vertical turning down, the horizontal up, through the angle of 90°. Afterimages are out of the question, and explanation by way of cortical disposition fails because the experience seems to be entirely new. An hypothetical movement centre in the brain has been suggested; but a more likely theory supposes a cortical short circuit.

Numerous experiments have been made to determine the quantitative aspects of the perception of movement, its extent and duration. Estimations of the extent of the movement of some part of the body appear to be founded on a fusion of articular, muscular, and tendinous sensations, and perhaps also cutaneous pressure. (See MUSCLE SENSE.) The actual liminal excursion has been found to be least in the case of the larger joints (0.22° to 0.60° for shoulder, hip, elbow), greatest for the smaller joints (0.50° to 1.30° for knee, finger, ankle).

But our ideas of the extent of movement are not limited to those which refer to members of our body; we can also estimate the extent of the movement of an object felt (skin) or of an object seen (eye). A stimulus moving over the skin excites end organs of pressure which possess different "local signs." If the first local sign has not lapsed from consciousness when the last is reached, we are able to estimate the extent of the movement in purely cutaneous terms; otherwise we may make judgments in visual terms. The least noticeable extent of cutaneous movement depends upon the place stimulated, the intensity of the pressure, and the rate and direction of the motion. On the forehead it may amount to 10 millimeters. A very slow movement may pass unnoticed. Movements lengthwise of a limb are less readily noted than movements crosswise, on account of the distribution of the nerve endings in the skin. Movement is often noted before direction of movement, either because the starting point is forgotten or because the judgment "movement" is more easily aroused than the judgment "movement in this direction." The visual idea of extent of movement may be variously formed. 1. If the eyes remain fixed while the object moves across the visual field, the estimation results from the stimulation of different local signs in a manner analogous to that of the purely cutaneous estimation. At the fovea the least noticeable amount of movement is probably about equal to the minimum visibile;

but in indirect vision it is only about a quarter of the limen of spatial duality. (See EXTENSION.) 2. If the fixation point of the eyes follows the moving object, the estimation of the extent of movement of the object is made in terms of the strain, pressure, and articular sensations evoked by the movements of the eyes in their sockets, of the head upon the shoulders, or of the body as a whole. Without the aid of some fixed point of reference, such as is actually used in eye measurement (see EXTENSION) and convergence, estimations of this second type are extremely uncertain, on account of the occurrence of unnoticed movements of the eyes themselves.

Turning to the temporal aspect of the perception of movement, we can say in general that quick movements are more readily noted than slow, whether they appeal to subcutaneous tissues, skin, or eye. On the skin a uniform rate in the stimulus is not perceived as a uniform rate in sensation, for a given movement appears more rapid where localization is more accurate. The slowest perceptible visual movement is at the rate of 0.0028 millimeter per second. In discriminating between two different rates the optimal speed is rather slow, because rates of movement which are at all quick are confused by the persistence of the excitation in the form of afterimages.

Finally, rate of movement, or, more strictly, a change in the rate of movement of the body as a whole, is perceptible, although no estimation of the extent of such a movement is possible. Upon vehicles like elevators, boats, etc., where there is little jar, it is easy to observe that, once the speed is uniform, it is impossible to perceive any motion; acceleration or diminution of this rate, however, sets up certain sensations due to the inertia of the body, and perhaps, too, other sensations mediated by the semicircular canals and otolith apparatus. See STATIC SENSE.

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MOVEMENT CURE. See MECHANOTHERAPY.

MOVENDO. See MANCANDO.

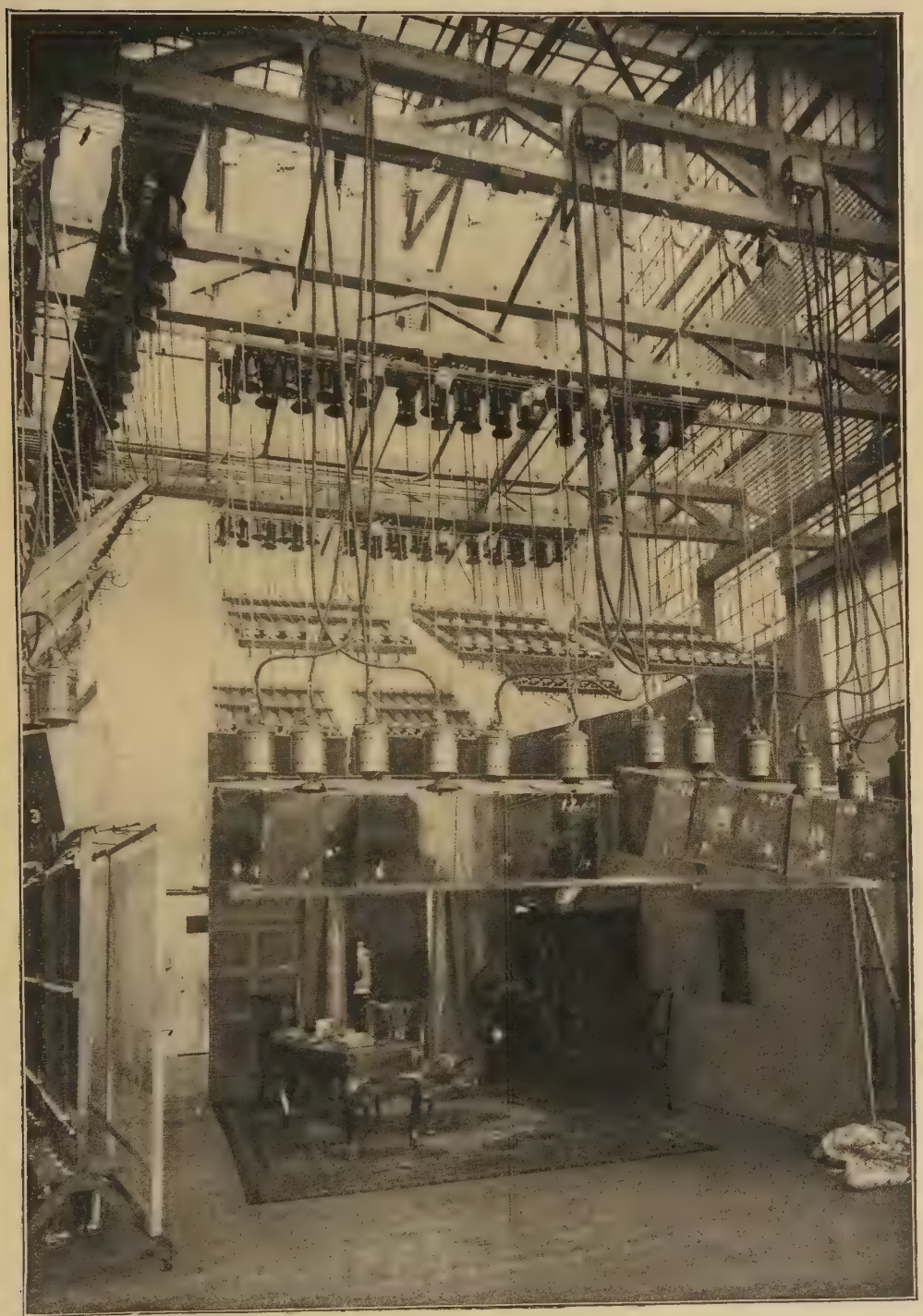
MOVERS, mō'vērs, FRANZ KARL (1806–56). A German divine and Orientalist. He was born at Koesfeld, Prussia, and was educated at Münster and Bonn. After being settled for six years over a church in Berkum, he was in 1839 appointed professor of Old Testament theology in the University of Breslau, where he remained until his death. His elaborate and scholarly treatise on the Phœnicians, *Die Phönizier* (vol. i, 1841; vol. ii, 1849–56), and as addition *Phönizische Texte* (1845–47), is his best-known work. He also wrote *Kritische Untersuchungen über die biblische Chronik* (1834) and the important dissertation *De Utriusque Recensionis Vaticinorum Jeremiæ Indole et Origine* (1837).

MO'VILLE. A seaport, market town, and summer bathing resort in County Donegal, Ireland, on Lough Foyle, 17 miles north-northeast of Londonderry (Map: Ireland, D 1). It is noted as a port of call of the Anchor and the Allan line steamers from New York to Glasgow. Pop., 1911, 1016.

MOVIMAN, mō-vē'man. The language of the Movinas (Mobinas) of Bolivia, South America, on the shores of Río Mamoré and Río Yacuma, about lat. 14° S. They are now civilized and very cleanly. Vocabularies of their language show but faint resemblances with any other. Consult D. G. Brinton, *The American Race* (New York, 1891), and A. F. Chamberlain in *Journal de la Société des Américanistes de Paris*, N. S., vol. vii (Paris, 1910).

MOVING PICTURES. The representation, suitably enlarged on a screen, of a series of photographs of objects in motion made on a ribbon-like film of sensitized celluloid, by means of a specially constructed camera, containing mechanism for alternately exposing and moving the film at a high rate of speed, in connection with a revolving shutter which prevents access of light through the camera lens to the film while the latter is being shifted from one position of exposure to another. In making the original photograph the film is placed on a reel in the camera and unwound by a hand-driven mechanism that advances it into a position where it is momentarily stationary during the exposure, a rotating shutter, an integral part of the machine, in the meantime operating to prevent access of light to the film during the time required to move it into position for the next exposure. After the film negative is developed, a positive is made by contact printing on a similar kind of film, and the latter, wound on a reel, is placed in a machine in which it is unwound, and while kept at a proper degree of tension it passes through a projection lantern provided with a powerful light. The magnified image of every picture on the film is projected in succession upon a screen or white surface in a darkened room, where the resultant effect, viz., the illusion of the representation of objects in actual and natural motion, may be observed by a large number of persons at one time. The sensitized films are made about 1000 feet in length; each picture is ¾ by 1 inch in size, the standard aperture on the projection machine being $\frac{11}{16}$ by $\frac{15}{16}$ inch.

The moving-picture illusion depends upon the fact that an impression received by the retina of the eye lasts for a short interval after the stimulus giving rise to the impression has ceased. This is commonly known as the persistence of vision, and its duration may vary from one-tenth to about one-fiftieth of a second. In the early part of the nineteenth century several interesting pieces of scientific apparatus were developed for combining a series of pictures representing bodies in motion, which produced the illusion of motion. One of the earliest of these was the stroboscope (q.v.), which consisted of a disk having a series of radial slits cut near its circumference. Representations of successive phases of a movement when rapidly moved as on the periphery of a second disk and viewed through these slits in the first disk also in revolution had an apparent motion that depended upon the relative motion of disk and moving body.



Studio of Lubin Manufacturing Co.

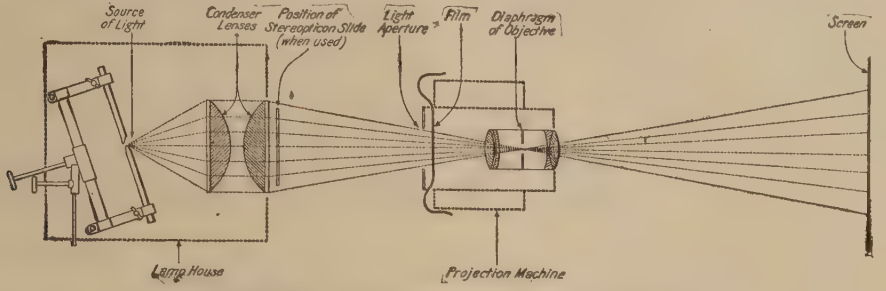
ELECTRIC LIGHTS AND ARRANGEMENT OF SCENERY IN A LARGE MOVING PICTURE STUDIO

TAKING A SCENE FOR A PHOTOPLAY

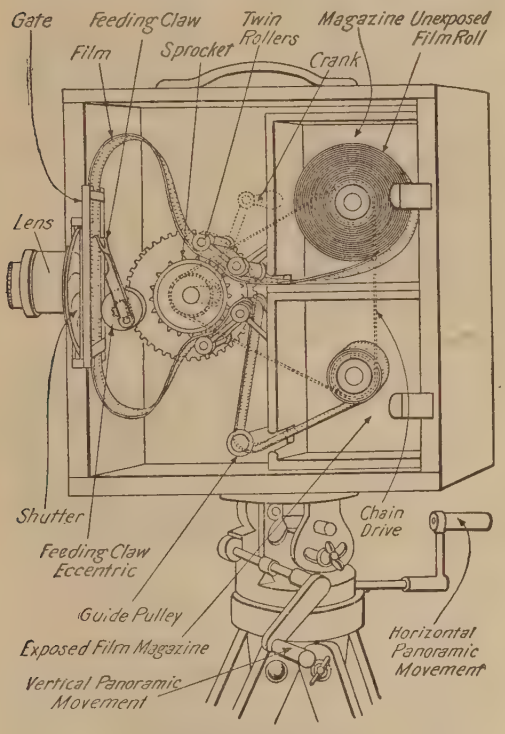
Studio of Lubin Manufacturing Co.

INTERIOR OF A MOVING PICTURE STUDIO, SHOWING THE MAKING OF A PHOTOPLAY

About 1845 the zoetrope was developed, consisting of a cylinder revolving on a vertical axis and having a number of vertical slits cut near the top. On the inside surface of the cylinder was placed a strip of paper having on it a series of pictures representing an object in successive stages of motion, as, e.g., a horse running. An observer looking through the slits at the moving picture inside the cylinder saw the object apparently in motion repeating the cycle of movement with every revolution of the apparatus. See ILLUSION.

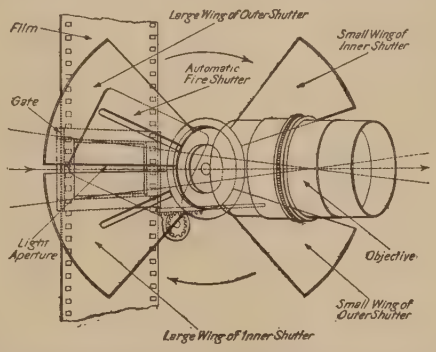


MOVING-PICTURE MACHINE — PRINCIPLE OF OPTICAL PROJECTION.



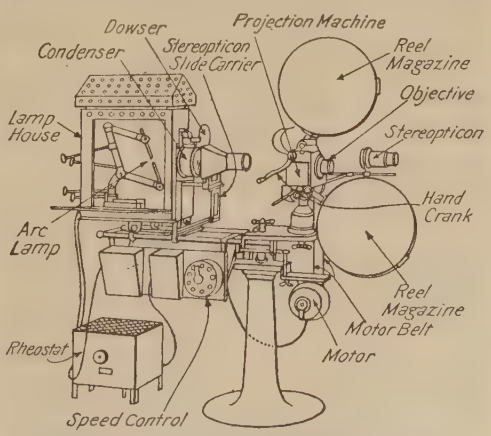
MOVING-PICTURE CAMERA.

In 1877 Eadweard Muybridge, in America, made a series of photographs of horses in motion, employing glass dry plates, as at this time sensitized films had not been invented. The horses were photographed at various points of their progress around a race track by placing along the track at certain intervals a battery of cameras in proximity, whose shutters were operated by a string broken by a horse as it passed along. In this way was secured a series of pictures which, while they showed the true position of the animal from the particular spot where the camera was placed at given instants, did not contain the essential elements of true moving pictures, as there was no exact regularity in the interval between exposures. Incidentally, however, they aroused a great deal of discussion among anatomists and artists, and settled conclusively some questions that had been in dispute between them. These pictures if combined did not possess that continuity of succession necessary to furnish the illusion to an observer of the horse moving in a natural



DOUBLE-CONE SHUTTER OF PROJECTION APPARATUS.

Position of the shutter when intermittent sprocket stops. The small wings pass in front of the light aperture when the film is moving.

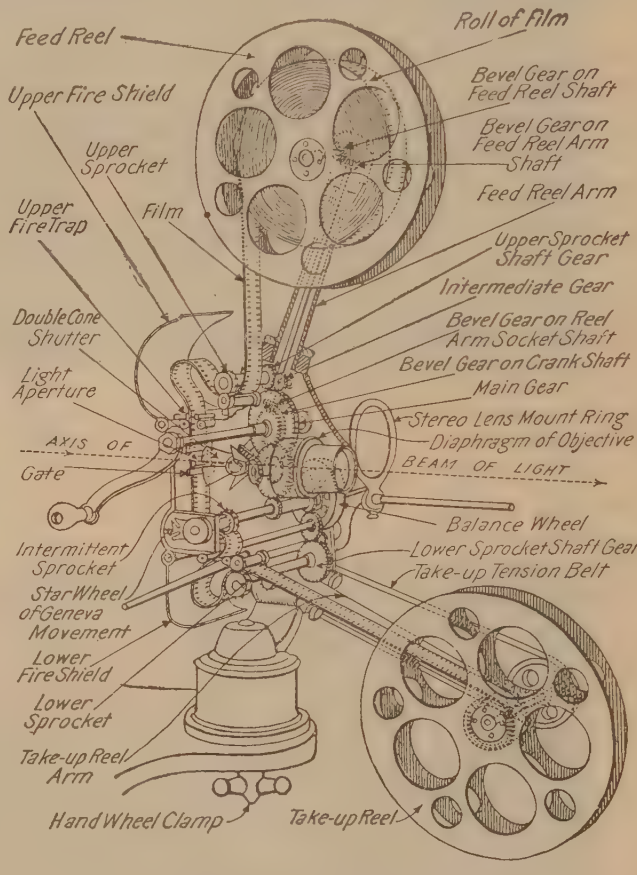


COMPLETE INSTALLATION OF PROJECTION APPARATUS.

manner, for in making the originals there was a space between any two cameras in which the position of the horse was not photographed, consequently on combining these successive camera records they were not consecutive. At the time the pictures were made, however, they marked a decided advance in the art of photographing objects in motion.

The kinetoscope (q.v.), brought out by Edison in 1893, and independently developed in a modified form by Lumière, Paul, and others shortly after, comprised a machine operated by hand or by electric motor for moving a transparent film in front of an aperture, through which an observer might view a consecutive series of pictures by the aid of a lens, suitable illumination of the film being provided. A modification of this apparatus allows the image of the film enlarged to be thrown by a suitable lantern so as to form magnified images of the photographs upon a screen. This in essence is the modern moving-picture machine. When projected at the rate of 16 to 20 pictures per second, one visual impression does not entirely die out before another succeeds it, and the illusion of actual motion results.

The shutter of the projection lantern interrupts the light for the short interval of time necessary to move the film into a new position and avoids blurring of successive impressions in the mind of the observer. Thus the motion of the film in a projection machine is an intermittent one, each picture being projected on the screen for an instant; then, the shutter coming into operation, the film is shifted so as to place the next picture in position for projection and the shutter opened, repeating the operation to the end of the film. A slower speed than 16 per second causes an impression of flicker and fatigue to the eye and produces an unsatisfactory picture. For the same reason it is possible for special purposes, as well as for grotesque and comedy films, so to speed up the projection machine that the objects appear to move at an exaggerated velocity not attained in the original motion.



MOVING-PICTURE-PROJECTION APPARATUS.
Detail of film operating mechanism.

For the actual taking of the pictures there have been developed many ingenious forms of cameras following the fundamentals already outlined, but carefully perfected as regards mechanical details and facility of operation. This is true not only with regard to the demands of the great moving-picture industry but also with reference to portable designs for military and aëronautical purposes, as well as for the study of wild life, exploration, etc.

Likewise projection machines have been developed to a high degree of mechanical perfection. Since the magnification of the pictures is very great, approximately 35,000 times, any minute defect in the machine that would produce an irregular feeding of the film, or cause a sudden jar or vibration to it, is intensified in the same proportion on the screen. While these machines are built to operate either by hand or by an electric motor, the former mode is often prescribed by city ordinances on account of the necessity of stopping instantly in case the film catches fire. The films are made with a row of perforations on each edge, which are engaged by the teeth of sprocket wheels on the machine, both above and below the lantern aperture, to insure a uniform rate of feeding and withdrawing the film and to avoid the buckling or undue accumulation of it at places where it would be likely to become ignited and cause a panic in the audience.

Until a short time ago fires in moving-picture theatres were of common occurrence, originating at or near the projection machine and caused by the ignition of the film. The usual cause was an accidental stoppage of the motion of the film by some defect in the machine itself or by carelessness or inattention on the part of the operator, for as soon as the film stops, the heat radiated by the arc lamp and concentrated by the lens on the film develops such a high temperature that the latter may be instantly ignited, unless an automatic shutter, to operate the moment the film stops, is provided. Another cause of such fires is insufficient protection afforded the film after it has passed in

front of the lens. If it is exposed underneath the projection machine, it may become ignited by an incandescent particle of carbon thrown off from the arc lamp. The danger of fire and the more serious panic incident to the ignition of the film has been largely diminished by inclosing the machine and operator in a noncombustible booth or compartment of tile or asbestos, to which no one but the operator has access, and providing it with a small window through which the light from the lantern may pass to the screen and with a noncombustible door that must be kept shut. By better design and construction of the machine, providing more perfect protection of the film, by causing it to pass through narrow slots or fire gates above and below the beam of light, and by a metal shutter which automatically drops between lens and film the moment the latter stops, fires have been reduced in number, and insurance and State or municipal regulations are now generally quite strict and enforced in this field.

The human as well as the mechanical features also have received attention, and the complication of apparatus involved in projecting moving pictures has led to the development of a class of employees as operators that possess considerable experience, judgment, and skill in securing uniformly satisfactory results on the screens. These men are often recruited from spot-light operators and electrical workers of the stage, and while the work does not involve delicate manipulation or expert scientific knowledge, there is, nevertheless, a noticeable difference in the results of the work of different operators with the same film. The proper adjustment of the latter in the projection machine, the correct and uniform speed of running it, in addition to coolheadedness in case of film fire or other mishap which might result in panic, are the requirements that should be possessed by the most successful operators.

In spite of precautions, fires sometimes occur in the operator's booth, and prompt and intelligent action by the man in charge of the projection machine often has prevented a panic that might have resulted disastrously, yet actually in many cases has caused but slight interruption to the exhibition of film pictures. In the larger American cities the operators receive a salary of from $20 to $35 a week, their work including both afternoon and evening representations.

Growth of the Industry. The growth of the moving-picture business has been phenomenal the world over. It is difficult to obtain exact figures either of the amount of capital invested in the business or of the daily or annual attendance at the theatres. With the development of the industry and the excellence of the pictures and plays, the number of persons attending moving-picture theatres is increasing rapidly. In 1902 the moving pictures were limited to a few "nickolodeons," and were accepted more as a mechanical freak than as a legitimate form of entertainment. In 1922 many of the largest and most costly theatres in the world are given over exclusively to the films. Aside from the huge cinema palaces which have been built in every city in the world, and some of which seat over five thousand people, such playhouses as Covent Garden in London, the Boston Opera House, the Hippodrome in Paris, and even the Shakespeare Memorial Theatre in Stratford-on-Avon have devoted themselves, temporarily at least, to the exhibition of moving pictures. There are approximately seventeen thousand film theatres in the United States, and about twenty thousand throughout the rest of the world. In the United States, the average daily attendance is some ten million people, which means that the paid admissions amount to more than thirty times the total population of the country. As the average price of admission is eighteen cents, the box office receipts per annum are about six million dollars. The same figures, of course, do not apply in other countries, as the United States is actually the birthplace of the motion picture, and also the pioneer in its development. But in Europe, and particularly in Great Britain, France, Germany, and Italy, the popularity of the cinema is incredibly great. The same is true of South America and Japan. In Australia it is estimated that half of the total population attends the film theatres each week, a higher average, unquestionably, than in any country outside the United States. Approximately 13 per cent of the regular moving-picture patrons in the United States are under fifteen years of age, and 33 per cent are from sixteen to twenty-five. The percentage of men exceeds that of women by a few points. The centre of moving-picture production is in Los Angeles, Cal., although New York has occasionally threatened to provide a rival. The number of producing units outside these two localities is negligible. After a picture has been completed, from twenty-five to three hundred copies of it are made and sent to various exchanges throughout the country. These exchanges attend to the work of distribution. In most cases, they are subsidiary units of the main producing organization, but a few of them are independent companies, operating on a commission basis. The films themselves are manufactured of a standard size and material so as to be available for use in projection machines in all countries of the world. The United States is divided into exchange districts, and films are used daily in successive motion picture theatres in each exchange district for six months, nine months, or a year. This service is given at a fixed rate to the exhibitor, the rate depreciating as time goes on and as the film loses its temporal value or becomes worn and frayed through constant use. The expenses of a motion-picture house with a seating capacity of 500 average between three hundred to five hundred dollars a week, but some of the larger theatres spend as much as three thousand dollars a week on programme and advertising. Practically, any theatre requires two thousand weekly admissions to be assured of a reasonable profit.

While many inventors have made machines and devices for connecting moving-picture projectors with talking machines, many of which have been extensively exhibited, it is difficult to make the combination a satisfactory one. Perfect synchronism and the reproduction of the tones of the voice in their original quality and sufficiently loud to be heard in every part of a theatre are very difficult to attain. Perfect voice reproduction is not considered impossible, however, and inventors' efforts are being continued, as is evidenced by several recent patents. Edison's kinetophone (q.v.), first put before the public in 1912, proved

moderately successful, but still defective in the quality of voice reproduction and sometimes lacking in synchronism. About the same time that Edison attacked the problem Gaumont and Clermont-Huet in Europe were endeavoring to construct talking picture machines. It can be readily understood that when the moving-picture machine and the phonograph are mechanically connected, any slip or imperfection of the parts will cause one to get out of time with the other, and for this reason simple mechanical connections for this purpose have been practically abandoned. A type of apparatus for the electrical control of one machine by the other, devised by Gaumont, in its latest form accomplished the result of uniform operation of the two machines by controlling the motor driving the projection apparatus by means of a current obtained from the armature of a motor generator attached to the operating shaft of the phonograph. Another talking moving-picture machine which promised excellent results operates on the principle of controlling the projection apparatus by means of a current derived from a commutator on the shaft of the phonograph motor. This commutator has six sections, each one of which is connected with an electro-magnet or solenoid having an iron plunger connected to a crank on the shaft of the projection machine. Thus each one of the magnets of this solenoid motor is actuated by current derived from any convenient circuit controlled through its respective section of the commutator on the shaft of the phonograph so as to produce perfect synchronism of projector and talking machine.

Often it is advantageous to show moving pictures in daylight. The use of a translucent screen, said to resemble parchment, and which is also fire and water proof, has been tried, the pictures being projected on the screen from behind, and the audience or a class under instruction sitting in front are enabled to make notes or refer to books, etc.

Photoplays. The moving-picture play as a distinct artistic form grew out of the moving picture in much the same way as the regular drama developed from the crude mimicry of early times. The process of evolution in the one case, however, occupied only a few years, while in the other it extended over centuries. Just as the most primitive forms of drama were probably no more than rude attempts to portray or caricature actual events in the lives of persons and animals, so the first moving pictures were mere photographic transcripts from life, with little or no attempt at artistic arrangement.

But when the public had once become accustomed to the novelty of the moving picture there was a natural falling off in attendance at the places of exhibition, and it became necessary to invent some further means of entertainment. The exhibitors hit upon the obvious device of telling a story by means of the pictures. At first the attempts were confined largely to broad comedy or farce of the slap-stick variety; but the popular success of these crude efforts opened the eyes of both public and producers to the artistic possibilities of the new form of entertainment, and photographic dramatizations of popular stories and plays began to appear.

These attempts at story-telling were decided improvements over the original pictures. They were far from satisfactory, however, because the producers had not yet realized that a new technique was necessary and were trying merely to duplicate the effects of the legitimate stage. It was only after long experiment that the advantages and limitations of the art as a distinct form revealed themselves and the moving-picture play as we know it to-day was evolved.

Technically the new form is perhaps more closely related to pantomime than to drama. There is this essential difference, however: in pantomime we accept the convention that there is a race of beings whose natural language is gesture and who are therefore capable of expressing all their thoughts and emotions without the assistance of words, while in the motion picture we imagine the characters to be speaking as in ordinary life though, by convention, we are unable to hear them.

It is this convention of silence which has imposed the chief limitations on the moving-picture play as an artistic form. So long as the characters in the moving-picture play can express nothing that cannot be conveyed by means of gesture or facial expression the moving-picture playwright is necessarily limited in the choice and treatment of his theme to the more elemental emotions. The moving-picture play does not, therefore, attempt to deal in psychological subtleties or nice shades of character, but relies for its effect mainly on plot, as does the pantomime. It has an advantage over pantomime, though, in its use of captions or leaders. These are printed matter—inscriptions, letters, dialogue, headings, etc.—thrown on the screen to explain a scene or sequence of scenes that would not be intelligible from the acting alone. The tendency, however, is to dispense with these devices wherever possible and allow the story to unfold itself in action.

In structure the moving-picture play follows the Elizabethan rather than the modern tradition. Change of scene is frequent, and there is no obligation on the part of the playwright to arrange the events of his story so as to fall into the ordinary divisions of time and space which is obligatory to the contemporary legitimate dramatist. If in the course of the play some of the characters move from Europe to America, the spectators may take passage with them and witness the events on the journey; if the hero and heroine steal into the garden for five minutes, they may follow and see precisely what happens instead of trusting their report when they return to the drawing room. This flexibility of form lends an impression of greater continuity in action and makes possible a wealth of detail and added air of veracity that renders the moving-picture play a dangerous rival to the type of regular drama in which character and psychology are subordinate to plot. Already there is a tendency on the part of writers of melodrama to imitate the dramaturgy of the moving-picture play.

It is in connection with the representation of dramatic scenes in the form of so-called photoplays that the moving-picture industry finds its widest application. Depicting current events in this way of course aroused interest, but this does not bulk large in connection with the portrayal of successive scenes from some new or standard play in which the action follows along rapidly and emphasizes the dramatic succession of incidents. This involves the reduction of a play to a simple scenario or story, or it may

be the construction of a scenario or outline from new and original ideas. Once this is done the work of staging and photographing the scenes must be started. This involves large expense and considerable time, as many of the situations may be modified as the work proceeds, to give them proper dramatic value and effect. For production on the large scale that is now necessary, when moving-picture plays as regards not only elaboration but even in prices charged for admission and seats are in some cases put on a level with actual stage productions, extensive workshops and large studios are increasingly common. Several photoplays may be in process of production simultaneously, and a large force of costume makers, scene painters, and other assistants are employed, together with the necessary workshops for developing and finishing the films as rapidly as possible. The expense of the duplication of a film, once it is made, is not large proportionately, and as soon as films are released for rental the profits, according to the popularity of the subjects, are very large. When a film has been made and found satisfactory for exhibition it is imprinted with the name of the manufacturer and copyrighted. A film may be run about 500 times in the hands of a careful operator before its condition renders its projection unsatisfactory by reason of streaks and spots that appear greatly magnified upon the screen; in addition to which there is a certain increased fire danger from the frayed and split condition of the edges when exposed to the intense heat in front of the lantern.

The original photographs are made not only in large moving-picture studios that have become so common, but it is often desirable to transport a company of actors long distances to make even one reel under the exact natural surroundings called for by the story to give it a proper historical setting. Thus, some films have been made in the desert of Sahara, in the South Seas, or in the most inaccessible portions of the Alps. In the United States moving-picture companies have often been sent from New York to the cañons and prairies of the Far West, to the battlefield of Bull Run, or to Fort Ticonderoga, in order to secure a natural setting and the required realism of surroundings. All of this of course is one of the incidental expenditures in the production of photoplays and one that involves a large sum.

The first photoplays were one or two reels in length, but with the production, in 1912, of *Queen Elizabeth* and *The Prisoner of Zenda*, the vogue of the "feature film," or five-reel picture, commenced. From then on, it became necessary to protract all photoplay stories to five reels, or about five thousand linear feet of film, whether the conditions warranted it or not. Victor Hugo's *Les Miserables* and Rudyard Kipling's *A Man There Was* had to be shortened and lengthened, respectively, until they approached a common size. In 1915, however, David Wark Griffith revolutionized all the theories of motion-picture production with *The Birth of a Nation*, which was the first multiple reel photoplay. He proved that one picture could provide an entire evening's entertainment, and that the public would pay as much to see it as they would pay to see a play on the speaking stage. Consequently, *The Birth of a Nation* paved the way for a great flood of eight, ten and twelve-reel pictures. Another type of photoplay, the serial, came into popular favor at this time. The serial is presented in episodic form, two reels at a time, and is usually melodramatic in nature, so that the suspense will be carried over from week to week. Most serials average thirty reels in total length, although several have materially exceeded that number.

The development of the photoplay has rested with a few genuine artists, and a host of imitators. Griffith, in *The Birth of a Nation*, introduced the first battle scenes, and his pictures of the Civil War served as models for all the various war pictures that were made between 1914 and 1919. Mary Pickford's popularity inspired countless golden-haired ingenues, just as Charlie Chaplin caused all film comedians to adapt black mustache and grotesque shoes. William S. Hart was responsible for the Wild West-cowboy melodramas, and Douglas Fairbanks for the acrobatic-hero farce-comedies.

When George Loane Tucker produced *The Miracle Man*, he promoted a wave of religious enthusiasm in the films. The success of Theda Bara in *A Fool There Was* started the "vampire" craze which lasted for several years. In the same way, the demand for "mother-love" themes originated with *Humoresque* and for symbolism with Griffith's *Intolerance*.

After the great war the screen reflected the general trend toward realism, and so-called "costume dramas" in historical settings fell into popular disfavor. But then, for the first time in seven years, films were imported from Germany, and they tended to reverse the situation. The first of these, *Passion*, was based on the story of Mme. DuBarry and the French Revolution, and it was followed by a number of others, including *Deception*, *Gypsy Blood* and *The Loves of Pharaoh*—all costume dramas. Not all of these German pictures were successful financially, but they inspired many American producers to attempt photoplays of an historical nature. Examples of films that demonstrate this influence are Douglas Fairbanks in *The Three Musketeers* and *Robin Hood*, and Griffith's *Orphans of the Storm*.

The Germans also introduced a distinct innovation, the futuristic photoplay, as exemplified by *The Cabinet of Dr. Caligari* and *The Golem*. These two pictures proved that the effect of a supernatural story may be vastly increased by the use of weird, impressionistic settings. They disclosed a fourth dimension on the screen.

Non-Dramatic Films. Aside from dramatic representations moving pictures are widely employed. The safety-first movement makes use of moving pictures to represent safe and unsafe methods of working in the vicinity of moving machinery, belts, gears, etc., as well as demonstrating how to avoid dangers that are constantly present to railroad men and industrial workers in their regular work around cars and engines and machines. Important commercial use has also been made of moving pictures, since a salesman, by means of a portable projection outfit, cannot only show the variety of goods manufactured or sold by the firm employing him, but can also make clear if necessary every step in the manufacture and marketing.

Although at first used as a means of popular amusement, moving pictures soon were found adapted to purposes of instruction. Educationally the value of properly prepared films

on a large number of subjects has been increasingly appreciated, particularly in technical schools and universities. The processes of mining, smelting, and refining of ore and the manufacture of the metal into various forms, the action of complicated pieces of machinery or machine tools, or a surgical operation illustrating the operative methods in use in various cases, can all be shown by a series of moving-picture films to large classes with great facility and advantage. Among topics that have achieved wide popularity are those showing the work of boy scouts; of fresh-air fund committees; crusades against tuberculosis, typhoid, and other diseases; how comunities combat the dangers of impure milk and of infection from flies and other insects; unhygienic housing conditions; harvesting and handling of grain; collection and manufacture of silk, etc. In addition there are illustrated Bible stories, also historic biographies, such as those of Lincoln, Washington, and other famous characters; and, where the attendance is composed largely of industrial workers and their families, first-aid methods in cases of accident and injury are often shown.

There is practically no portion of the earth's surface that has not been photographed by the motion-picture camera. Travel films are a regular feature of the bill at almost every cinema theatre, and their educational value cannot be underestimated. Schools and colleges, realizing this, have used them extensively in connection with geographical instruction. A notable example of the travel pictures was *Nanook of the North* which depicted the life of that Eskimo so graphically and so dramatically that it achieved as much popularity as the most successful of the regular "feature" photoplays.

With a judicious selection of subjects moving pictures have been employed for the diversion and amusement of the inmates of penal institutions and insane asylums with good results. In the Montana Penitentiary and at Sing Sing, New York, films have been shown regularly every Sunday, and all convicts with a record of good behavior during the week were allowed to witness them.

For instruction in rifle practice moving-picture films representing moving persons and objects, bodies of cavalry, artillery, etc., are projected upon a background of scenery representing some locality unfamiliar to the troops who are being instructed. The background or screen is in semidarkness in order that the objects to be fired at may appear more distinctly, but the men at the firing line are in daylight, so that there is no difficulty in sighting the rifles. The projection apparatus is arranged so as to permit stopping the film long enough to show the location of the hits on the various parts of the target. After recording these the film is moved on and firing proceeds.

Photography from aëroplanes was developed extensively during the Great War because of the obvious military value of such films. The camera was used to record the effects of shell fire, enemy operations and strategic positions. Aërial photographs are now taken of cities, mountain ranges and unexplored regions, and are also used widely in connection with the news reels.

Some highly successful results have been secured in making pictures under water. The camera is placed in a closed, water-tight compartment, lowered into the water from a boat. This chamber is provided with a plate-glass window, in front of which a number of powerful electric lights are suspended, so as to illuminate any objects in the immediate vicinity with sufficient brightness to enable photographs to be made, even at depths as great as 60 feet, showing fish, plants, and other objects that otherwise could not be studied in their natural surroundings.

The slow-motion camera, as it is called, is in reality an ultra-rapid machine which records swift action with such speed that it is reduced to slow motion on the screen. Ordinarily, the camera will expose ten frames of film (ten separate pictures) in a second; the ultra-rapid process will expose four times that number, so that a race-horse, traveling at maximum speed, may be shown so distinctly that every detail of his muscular exertion is clearly visible.

Censorship. In 1909 the National Board of Censorship was organized at the request of the proprietors of many moving-picture theatres in New York City. This was a voluntary, unofficial group formed by the People's Institute of that city, and composed of professional and business men and women, social workers, and many others interested in the problems that have been brought up by the development of the moving picture. The members of the Board served without compensation, and their decisions had no legal force, although the film producers agreed to abide by them. Their object was to prevent photoplays of a questionable nature from being exhibited to the general public, since it was realized that so large a portion of every audience must necessarily be composed of children.

For some time this board operated successfully, but its principle reason for existence was removed with the advent of official State censorship. This censorship has been applied in many States, but most rigorously in Pennsylvania and Ohio, where the standards of judgment are peculiarly strict. Owing to the difference in the attitude of these regulatory boards in different States, the results are sometimes absurd. There have been cases of the total rejection of a photoplay by the censors of one State and its approval, unchanged, by those of another. In general, however, they have concentrated their attention on crime topics, immorality, and the exposure of the person. Censors are often offended more by the suggestion of evil than by anything in the action of a play. In one State the suggestion of expected motherhood is under the ban and may not be portrayed in the films; while in others, certain scenes that are in themselves sordid and even disgusting are allowed to run, provided the evil doer is suitably punished.

This uncertain situation, of course, has worked great harm to the motion-picture industry, since many photoplays must undergo complete revision every time they pass a State line. As a result, the producers have expended great sums of money to combat the extension of censorship and to work for the repeal of existing laws. The appointment of Will H. Hays as director-general of the industry was a direct result of this agitation, and represented a determined attempt on the part of the producers to purify the moving pictures from the inside so that the need for censorship would be removed.

Popularity. Every possible subject seems to have been covered by the films, from the daily

news service to religious, historical, and other educational subjects; in addition to sports, travel, military and naval events, fiction, comedy, tragedy, and the romantic drama. The audiences are cosmopolitan, composed of persons of all ages, nationalities, and conditions of life. The low price of admission prevailing as compared with that charged at regular theatres attracts many in search of diversion, entire families who would otherwise seldom go to an ordinary theatre are enabled to attend.

Bibliography. There is a constantly growing popular, as well as more or less technical, literature in this field available for consultation. There may be recommended the following: E. Muybridge, *The Horse in Motion* (Philadelphia, 1878); D. S. Hulfish, *Cyclopedia of Motion-Picture Work*, American Technical Society (2 vols., Chicago, 1911); F. H. Richardson, *Motion Picture Handbook* (2d ed., New York, 1912); *Moving Picture Annual and Yearbook* (ib., 1912 et seq.); Carl Froch, *Der Kinematograph und das sich bewegende Bild: Geschichte und technische Entwicklung der Kinematographie bis zur Gegenwart* (Vienna, 1913); F. A. Talbot, *Practical Cinematography and its Applications* (London, 1913); *Modern Bioscope Operator* (ib., 1913); J. A. Nelson, *The Photoplay: How to Write and How to Sell* (Los Angeles, 1913); E. W. Sargent, *Technique of the Photoplay* (2d ed., New York, 1913); Esenwein and Leeds, *Writing the Photoplay* (Springfield, Mass., 1913); J. B. Rathbun, *Motion Picture Making and Exhibiting* (Chicago, 1914); Horstmann and Tousley, *Motion Picture Operation* (ib., 1914); J. H. Hallberg, *Motion Picture Electricity* (New York, 1914); *Kinematograph Year Book, Diary*, and *Directory* (London, 1914); *Kinematograph and Lantern Weekly* (ib., 1914 et seq.); also the following publications of the National Board of Censorship of Motion Pictures: Annual Reports of the Board; *Policy and Standards of the National Board of Censorship; The Question of Motion Picture Censorship; Suggested Ordinance and Requirements for Motion Picture Theatres.* See KINETOSCOPE.

MOVING PLANT (*Desmodium gyrans*). An East Indian plant of the family Leguminosæ, remarkable, as are also some other species of the same genus, for the autonomic movements of the leaves, which are ternate, the lateral leaflets much smaller than the terminal one. These lateral leaflets are in constant motion, being elevated by a succession of little jerks, and then moving downward by similar rapid jerks. The terminal leaflet does not remain absolutely at rest, although its movements are not like those of the lateral ones. This is the most striking example of autonomic movements in plants. The movements are not very rapid, a complete up-and-down movement requiring two to four minutes, the fall being more rapid than the rise. The reason for these movements is unknown, nor are they known to be of any value to the plant. See MOVEMENT.

MOVING STAIRS. See ELEVATOR, *Escalator*.

MOWAT, mō'at, SIR OLIVER (1820–1903). A Canadian statesman, born in Kingston, Ontario, of Scottish parentage. In that city and in Toronto he was educated. He became a barrister (1841), practiced his profession in Kingston and Toronto, and was made queen's counsel in 1855. He was a Liberal member of the Canada Legislative Assembly for South Ontario in 1857–64, Provincial Secretary in the Brown-Dorion cabinet in 1858, Postmaster-General in the Macdonald-Dorion cabinet in 1863–64, and a judge of the Court of Chancery for Ontario from 1864 until 1872. Before accepting a seat on the bench Mowat was a strong advocate of Confederation, and was one of the delegates to the Quebec Conference (1864) at which its fundamental terms were settled. Resigning from the bench in 1872, he was elected leader of the Ontario Liberals and became Premier of that province, which position he retained for the unprecedented term of 24 years. As Premier his administration was chiefly noteworthy for its defense of provincial rights, Ontario's contention against the Dominion being sustained in several cases by the final court of colonial appeal, the Judicial Committee of the Privy Council. The best known of these cases arose from the boundary dispute between Ontario and Manitoba. (See MANITOBA, *History*.) Mowat also procured the passage of a large number of useful provincial laws. Legal reform early engaged his attention, and in 1856 he was a member of a commission for consolidation of the general statutes respectively of Canada and Upper Canada. During his premiership an act for the creation of a High Court of Judicature was passed, the object being the fusion of the courts of law and equity. In 1896 he was called to the Dominion Senate, where he became Liberal leader, also being appointed Minister of Justice in the administration of Sir Wilfrid Laurier. He was afterward Lieutenant Governor of Ontario (1897–1903). Consult J. C. Dent, *Canadian Portrait Gallery* (Toronto, 1880), and C. R. W. Biggar, *Sir Oliver Mowat* (ib., 1905).

MOWBRAY, mō'brā, HENRY SIDDONS (1858–). An American decorative and figure painter, born of English parentage in Alexandria, Egypt. He was brought to the United States in 1859. In 1878 he went to Paris, where he studied under Bonnat. He started as an illustrator and painter of subtly refined ideal subjects and portraits, such as "A Lady in Black" (Buffalo Academy), "Idle Hours" (National Gallery, Washington), and "Le Destin," and was the first director of the American Academy at Rome (1903). In later years he confined himself to decorative painting, in which he displays great artistic intuition, restraint, elegance of composition and draftsmanship, and warmth of tone. In his beautiful adaptations of Pinturicchio's frescoes in the Borgia Apartments of the Vatican for the Library of the University Club, New York, he has thoroughly grasped the Italian master's style, and his original lunettes are no less admirable than the copied panels. Other fine decorations include the frieze "Development of Law" in the Appellate Court, New York; mural paintings in the Congressional Library, Washington, the Federal Court, Cleveland, the library of J. Pierpont Morgan, New York (also ceiling), and the private residences of C. P. Huntington and F. W. Vanderbilt, New York, and of Larz Anderson, Washington. He was elected a National Academician in 1891 and received a gold medal at Buffalo in 1901.

MOWBRAY, ROBERT DE, EARL OF NORTHUMBERLAND. See NORTHUMBERLAND.

MOWER. See REAPERS, REAPING.

MOWER, mō'ẽr, JOSEPH ANTHONY (1827–

70). An American soldier, born at Woodstock, Vt. He fought in the ranks during the Mexican War, but rose, in 1861, to be a captain in the regular army. During the first year of the Civil War he took part in the military operations in Kentucky and Tennessee, rendering conspicuous service. In November, 1862, he was promoted to brigadier general of volunteers, and was placed in command of a brigade before Vicksburg (1863). In 1864 he was promoted to the rank of major general of volunteers and commanded a division in Louisiana. Later he accompanied Sherman in the Atlanta campaign. Upon the reorganization of the army at the close of the war he was commissioned colonel of the Thirty-ninth Infantry and received command of the Military Department of Louisiana.

MOWRY, mou'rĭ, WILLIAM AUGUSTUS (1829–). An American educator and historical writer, born at Uxbridge, Mass. From 1854 to 1857 he studied at Brown University, from which he received an honorary A.M. in 1866. For many years he was engaged in educational work in Rhode Island and Massachusetts. In 1884-85 he was editor of the *Journal of Education* and from 1886 until 1891 of *Education*. He wrote: *Elements of Civil Government* (1890; new ed., 1913); *Talks with my Boys* (1892; 5th ed., 1909); *A History of the United States* (1896); *First Steps in the History of our Country* (1898; rev. ed., 1914), with A. May; *American Inventions and Inventors* (1900); *Marcus Whitman and Early Oregon* (1901); *The Territorial Growth of the United States* (1902); *American Heroes* (1903), with Blanche S. Mowry; *American Pioneers* (1905); *Essentials of United States History* (1906; rev. ed., 1914); *Recollections of a New England Educator* (1908).

MOXA. The downy hairs of *Artemisia moxa*, a plant of the family Compositæ; also the plant itself. The Chinese and Japanese use this substance as a cautery and a counterirritant.

MOX'OM, PHILIP STAFFORD (1848–). An American Congregational clergyman, born at Markham, Canada. He came to the United States at an early age and a year after the outbreak of the Civil War joined the Federal army. In 1875 he entered the Rochester Theological Seminary, where he remained three years, then entered the University of Rochester, where he graduated in 1879. He was pastor of the First Baptist Church in Cleveland, Ohio, from 1879 until 1885, and of the First Baptist Church in Boston from 1885 until 1894, when he took charge of the South Congregational Church in Springfield, Mass. He was university preacher at Harvard in 1894–97. His publications include: *The Aim of Life* (1894); *From Jerusalem to Nicea: The Church in the First Three Centuries* (1895); *The Religion of Hope* (1896); *Two Masters: Browning and Turgenief* (1912).

MOXON, mŏk'son, EDWARD (1801–58). An English publisher and minor poet, who went to London from his native Wakefield and, after some experience with Messrs. Longman, set up for himself as a London publisher in 1830, Samuel Rogers supplying the capital. A book of verse of his own, *The Prospect and Other Poems*, appeared in 1826. He published for a number of illustrious English authors, among them Wordsworth, Shelley, Browning, Monckton Milnes (Lord Houghton), Tom Hood, Lord Lytton, and Tennyson. An interesting incident in his career was the suit which was brought against him on a charge of blasphemy for publishing Shelley's *Queen Mab* —a case which was successful and compelled the deletion of certain passages in a number of subsequent editions. A second volume of Moxon's verse (1837) was combined with his first volume, the two appearing together in 1843. Moxon's business, as continued by Arthur Moxon and J. B. Payne, had among its publications Swinburne's *Atalanta* (1865). In 1871 the business of the Moxons was merged with that of Ward, Lock, and Tyler.

MOXOS, mō'hŏs, MOJOS, MOHOS, or MUSU, mōō'sōō. A noted group of tribes occupying the Province of Moxos, on the upper region of the Mamoré and Beni rivers, in northeastern Bolivia, and speaking a language of the widespread Arawakan stock (q.v.). By submitting themselves to the Inca Yupanqui they became incorporated with the Peruvian Empire (see QUICHUA), and an Inca colony was established in the province. In 1564 they repelled a Spanish invasion of their country, but in 1674 readily accepted the teaching of the Jesuit missionary Baraza, who worked among them for nearly 30 years and succeeded in collecting them into 15 mission villages, at the same time teaching them agriculture, weaving, and carpentry. Moxos missions grew and flourished, other neighboring tribes being also gathered into them, until in 1726 their 15 villages numbered 30,000 Christian Indians, representing nearly 30 tribes and at least 9 distinct languages, the Moxos proper predominating. With the expulsion of the Jesuits in 1767 the mission period came to an end, but the former converts maintained themselves as a civilized population and exist to-day in practically undiminished numbers. Physically they are of rather light complexion, with intelligent and handsome features. They are grave and thoughtful, honest and devoutly religious, peaceable and civil, but carrying always an air of independence. They are successful farmers, expert boatmen, and skillful with the lariat.

MOYABAMBA, mō'yä-bäm'bä. A town of Peru. See MOYOBAMBA.

MOYA Y CONTRERAS, mō'yä ē kŏn-trā'räs, PEDRO DE (c.1520–91). A Spanish prelate and administrator, born in the diocese of Cordova. He received the doctorate in canon law at the University of Salamanca and afterward held numerous ecclesiastical positions, including those of inquisitor at Saragossa and Murcia. In 1571 he was sent to Mexico, as chief inquisitor, to establish the Inquisition there. He became Archbishop of Mexico in 1573 and was Viceroy of New Spain during 1584 and 1585. He summoned and presided over the third provincial council of the church in Mexico (1585). After his return to Spain in 1591 he was appointed president of the Council of the Indies.

MOYNE. See LE MOYNE.

MOYNE, PIERRE LE. See IBERVILLE, SIEUR D'.

MOYOBAMBA, mō'yō-bäm'bä, or **MOYABAMBA.** The capital of the Department of San Martín, Peru. It is situated in the northern part of the department, on the river Mayo and on a plateau of loose, sandy material, which the floods wash out, forming large ravines penetrating the town (Map: Peru, B 5). It has a fine healthful climate, with an average temperature of 77° F. The town consists

mainly of isolated houses thatched with palm leaves and scattered over a large area. The principal industry is the manufacture of Panama hats. Moyobamba has some trade with Brazil by way of the Amazon, with which the Mayo communicates through the Huallaga, but otherwise it is practically cut off from communication with the rest of Peru. Pop. (est.), 9000.

MOYSE, mwäz, HYACINTHE (1769–1801). A Haitian revolutionist, nephew of Toussaint L'Ouverture. In 1791 he headed a revolt against the whites and won the battle of La Croix-des-Bouquets, driving the whites into Port-au-Prince. This success was followed by a general revolt in the south and west, accompanied by massacres, executions, and devastation of the country. In 1794 he joined the party of Toussaint L'Ouverture (q.v.) and was made general of a brigade. He aided in the expulsion of the English (1798) and was commander of the Army of the North in the attack on Spanish Santo Domingo in 1801. Displeased at the despotism and usurpation of Toussaint, Moyse was accused of instigating a revolt in the north. He was arrested and court-martialed and with 23 of his men was blown from the cannon's mouth.

MOZAMBIQUE, mō'zam-bēk'. The former name of Portuguese East Africa (q.v.), now restricted to the northeast coast of that colony (Map: Africa, H 6).

MOZAMBIQUE. The capital of the Portuguese Province of Mozambique, situated on a small coral island separated from the east coast of Africa by a strait a mile wide, at the narrowest part of the Mozambique Channel (Map: Africa, J 6). Its principal buildings are the Governor-General's palace, the custom-house, the hospital, and the cathedral. It has three interesting old forts dating from the early sixteenth century, one of which is built entirely of stone imported from Portugal. Mozambique was formerly a centre for the slave trade and has declined in importance since that era. There is some traffic in rice, gum, gold dust, and timber; the shipping amounts to 150,000 tons annually. Pop., 1910 (est.), 362,000.

MOZAMBIQUE CHANNEL. The body of water between the east coast of Africa and the island of Madagascar (Map: Africa, J 6). It is about 1000 miles long, and its width ranges from 260 miles at the middle to nearly 600 miles at either end. The principal river flowing into it is the Zambezi. The Comoro Islands lie in the north entrance to the channel, and on the west shore are the ports of Beira and Mozambique. A warm current flowing through this channel strikes the Agulhas Bank to the south and produces in the shallows one of the roughest seas in the world.

MOZARABIC (mōz-ăr'ă-bĭk) **LITURGY** (Sp. *Mozárabe,* from Ar. *Mustarb,* from *ta 'arrab,* to become an Arab, from *'arab,* Arab), or GOTHIC LITURGY. The ancient liturgy of the Church of Spain. The former title is derived from the name applied to the Christian inhabitants after they were subjected to the Arab domination; the latter is applied to it because it was most widely used during the Gothic period. It is also called the Toledan or Isidorian rite. A common opinion has been that it was of Eastern origin and was brought by the Goths from Constantinople or Asia Minor in the fifth century and then revised by St. Isidore of Seville; but some recent writers regard it as of Italian origin, with additions from Gaul and Africa. In the second half of the eleventh century the Roman liturgy began to supersede it; but this change was stubbornly resisted. In the end six old churches in Toledo were allowed to retain the local rite. Cardinal Ximenes made special efforts at the beginning of the sixteenth century to prevent the liturgy from falling into oblivion and founded a chapel expressly for its use. He also caused a number of learned priests to collate the existing manuscripts and published a revised edition, unfortunately incomplete, in 1500–02. At present it is still used in this chapel daily, and at a chapel in Salamanca once or twice a year. The affinities of this liturgy with the Gallican and the Greek make its study important to liturgical scholars. It was reprinted by Lesley (Rome, 1755) and by Lorenzana (ib., 1804); it is in Migne, *Patrologia Latina,* lxxxv, and the Breviary in lxxxvi, and a new edition appeared at Toledo in 1875. Consult J. M. Neale, *Essays in Liturgiology and Church History* (London, 1863), and C. E. Hammond, *Ancient Liturgies* (Oxford, 1879). See LITURGY.

MO'ZART, *Ger. pron.* mō'tsârt, LEOPOLD (1719–87). A German musician, father of Wolfgang Amadeus Mozart, born at Augsburg. He was sent to study law at Salzburg, but became a chorister and afterward a music teacher, as he played the violin well, and in 1743 was made a member of the Prince-Bishop's orchestra. In 1762 he was appointed court composer. He produced about 12 oratorios, 18 symphonies, 6 trio sonatas, as well as serenades and concertos. Twelve of his pianoforte pieces were published under the title *Der Morgen und der Abend.* His famous violin method, almost the first of its kind, *Versuch einer gründlichen Violinschule* (1756), was often reprinted and translated; but his chief service to the world was the careful and sympathetic training of his son, the great Mozart, whose genius he judiciously fostered.

MOZART, WOLFGANG AMADEUS (1756–91). A famous German composer. He was born at Salzburg, Austria, Jan. 27, 1756. Mozart's love for music first manifested itself when his eldest sister, Nannerl, began to receive musical instructions from her father. When he was only five years old he composed little minuets and was discovered at work on a concerto. At six he had become so proficient as a performer on the piano, and his sister's progress also had been so great, that their father took them on a tour of the leading capitals of Europe, everywhere meeting with notable receptions.

In 1768 the elder Mozart again took his son to Vienna. There this boy of 12 conducted a solemn mass of his own composition, and his operetta *Bastien und Bastienne* was given at a private performance. After a brief sojourn in Salzburg, where Wolfgang was appointed concert master to the Archbishop, his father took him to Italy. In Rome he heard the famous *Miserere* of Allegri, which was so jealously guarded by the authorities that musicians were forbidden to copy it under pain of excommunication. After twice hearing it young Mozart wrote it out by ear. His compositions and his performances made such a profound impression

that the Pope created him Knight of the Golden Spur, and at Bologna he was elected a member of the Philharmonic Society. At Milan he received a commission to compose an opera, the result being *Mitridate re di Ponto*, which was brought out in December, 1770, and had 20 consecutive performances. His knowledge of the Italian style of singing was greatly broadened through this Italian trip, and especially through his acquaintance with the male soprano Farinelli, the greatest singer of his time.

After another brief sojourn in Salzburg he returned in August, 1771, to Milan, where he brought out his serenata *Ascanio in Alba*, in honor of the nuptials of Archduke Ferdinand, a son of Maria Theresa. The death of Archbishop Sigismund at Salzburg was a severe blow to the Mozarts; for his successor, Hieronymus, for whose installation Mozart composed *Il sogno di Scipione* (The Dream of Scipio), showed little appreciation of his genius. Two other Italian stage works, *Lucio Silla* and *La finta giardiniera*, were produced in Milan, and the latter also in Munich; and on the occasion of Archduke Maximilian Francis's visit to Salzburg, in 1775, he brought out *Il re pastore*.

Disgusted with the obstacles which Hieronymus constantly threw in his way, Mozart, accompanied by his mother, again started out on his travels in September, 1777. In Mannheim he met the Weber family, which was destined to play an important part in his life. The head of this family, Fridolin von Weber, was prompter and copyist at the theatre. The eldest daughter, Josepha, afterward Frau Hofer, was the prima donna for whom in later years Mozart wrote the "Queen of the Night" music in *The Magic Flute*. A younger daughter, Aloysia, afterward Frau Lange, was for a time Mozart's pupil, and he promptly fell in love with her. Another daughter, Constanza, later became his wife. A trip to Paris ended tragically in his mother's death. He returned to Salzburg, stopping on his way in Munich, where Aloysia had secured a position and where he learned that she no longer cared for him. In after years, however, this youthful sweetheart did more than any other singer to make his music famous. While in Paris he made a friend of the encyclopædist Grimm.

At Salzburg he composed the music to the tragedy *King Thamos* and began the composition of an operetta, *Zaïde*, which was interrupted by an invitation to compose an opera for Munich. *Zaïde* was never finished, but the result of the Munich invitation was the opera *Idomeneo*, which opened a new epoch in his life, being his first masterpiece in the grand style. During a visit to Vienna in 1781 Mozart terminated once for all his relations with the boorish Hieronymus, who had grossly insulted him. He took up his residence with the Webers, who were now in Vienna. His father strongly objected to this, and he moved his lodgings. But he had fallen in love with Constanza, and in August, 1782, they were married. Notwithstanding the grinding poverty of their lot, their marriage was a happy one, for their mutual love atoned for the hardships which constantly confronted them. His marriage took place shortly after the production in Vienna of his opera *Belmonte und Constanza, oder Die Entführung aus dem Serail*. The Italian musicians of Vienna, headed by Salieri, used all means in their power to have the production fail, but it was triumphantly successful. Gluck attended one of the performances and was enthusiastic in his approval of it. Nevertheless, from this time on Mozart was constantly met by the hostile machinations of the Salieri party, which greatly embittered his career.

The success of the opera led the Emperor to order a new opera buffa of Mozart, who, in connection with its composition, was brought together with Lorenzo da Ponte. The result was *Le nozze di Figaro*. Beaumarchais's work on which the libretto is based had been forbidden in Vienna on the ground of its immorality. Mozart, however, went to work on the score, and when part of it had been composed, Da Ponte found opportunity to have the Emperor hear it, with the result that he ordered its completion and performance. Besides this he gave the composer an order for a musical comedy, *Der Schauspieldirector*, for a garden fête at Schönbrunn. Throughout the preparations for the production of *Figaro* Salieri and his adherents were active in opposition, and the first performance, in May, 1786, came near being a failure. In January, 1787, however, it was received with immense enthusiasm at Prague, where Mozart became a popular idol. The concerts which he gave there were immensely successful, and he was engaged to write another opera. Da Ponte suggested *Don Giovanni* to him and in April placed the libretto of the work in his hands. By September Mozart and his wife and Da Ponte were in Prague, rehearsals were taken in hand, and late in October *Don Giovanni* was produced and was even more successful than *Figaro* had been.

During a tour undertaken in 1789 with Prince Carl Lichnowski, the destination being Berlin, Mozart stopped en route at Leipzig, where he played in the Thomaskirche and was deeply impressed with Bach's motets. In Berlin his success was such that Frederick William II offered him a position as kapellmeister with a salary of 3000 thalers. But a few words of reassurance from the Austrian Emperor, accompanied with an order for a new opera, coupled with his own strong feeling of loyalty, unfortunately induced him to decline the King's offer, the best he had had. The opera was *Così fan tutte*, which was produced in Vienna in January, 1790. After a visit to Frankfort to attend the coronation of the new Emperor, Leopold II, he returned to Vienna. Meanwhile his old acquaintance Schikaneder was managing a theatre in Vienna. The affairs of the house being precarious, he thought to better them by producing an opera by Mozart, and so applied to him in the spring of 1791 to write a "fairy" opera—"a piece that would attract." Schikaneder himself furnished for Mozart the libretto to the *Zauberflöte* (The Magic Flute). The work was interrupted by an order to compose an opera for the coronation of Leopold as King of Bohemia at Prague in 1791. It was *La clemenza di Tito*, written in a few weeks by a man already much overworked. It did not make much impression. *The Magic Flute* was brought out in September, 1791, under the composer's own direction and with distinguished success.

But Mozart's constant struggle with intrigue and pecuniary necessities, and the strain to which he had subjected himself in order to meet these by constant work, had begun to tell upon him, and when, even before he had finished *The Magic Flute*, he received a mysterious commis-

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sion to compose a requiem, he felt that he was writing his own swan song. It is now known that the commission came from a Count Walsegg, whose intention was to have the work performed as his own and who therefore kept his identity from Mozart. So fixed became Mozart's idea that he must complete his *Requiem* before death overtook him that even when his wife drove out with him, so that he might be in the open air, he insisted on taking his portfolio of music paper along. It was on one of these drives that his melancholy led him to express the belief that he had been poisoned at the instigation of his Italian rivals, a suspicion which does not, however, seem to have been borne out. Feeling that he would not live long enough to finish the *Requiem* himself, he sketched out the principal features of the uncompleted part, leaving them for his pupil Süssmayer to fill out. The night before his death he gathered some of his favorite singers about him, had the score of the *Requiem* brought to his bed, and the work was sung until the "Lacrimosa" was reached, when Mozart burst into tears and closed the score. His death came at one o'clock in the morning of December 5, and an eyewitness says that his last motion was an endeavor to imitate the kettledrums in the *Requiem*.

Mozart created no new forms, but filled those of his predecessors with his own individual genius; so that, when he died, his works marked, up to that time, the culmination of every form of music, with the exception only of the oratorio and the fugue. Above all, Mozart was a universalist who moved with equal freedom in all the fields of instrumental and vocal music. Both his inventive and plastic powers were extraordinary, and his mastery of all technical means supreme. But it must not be supposed that he acquired all this without effort. In 1908 Schünemann published Mozart's notebook of the year 1764, which shows that the eight-year-old composer was by no means a finished artist. Mozart arrived at consummate mastery at an earlier age, it is true, than most great masters, yet only through constant and conscientious practice. In quite recent years the researches of musical scholars have thrown new light on the influences that developed the master's individual style. Mozart's mind was one of unusual receptivity. He learned from all his predecessors, but especially from Stamitz, Johann Christian Bach, Franz Xavier Richter, and Johann Schobert (qq.v.). It has been proved that several works listed in Köchel's thematic catalogue are not original compositions by Mozart, but studies on works by the composers just mentioned. Thus, Wyzewa and Saint-Foix established the fact that the first four piano concertos are only studies on sonatas by Schobert (*Zeitschrift der internationalen Musikgesellschaft*, November, 1908). Likewise the symphony listed by Köchel as No. 18 is only a copy in Mozart's handwriting of a work by K. F. Abel (q.v.). Far from detracting from the master's real greatness, the result of these researches proves but the seriousness and scrupulous care with which the young man strove for perfection.

Rubinstein's words, "Eternal sunshine in music, thy name is Mozart," are a happy characterization of the master's style, which is an ideal combination of Italian melodiousness (in the best sense, of course) and German seriousness. This eternal sunshine, however, is one of the chief reasons why Mozart's music has paled before the more varied and compelling utterance of a Beethoven, Brahms, and Wagner.

Mozart's dramatic works have been completely enumerated in the preceding biographical sketch. The greatest of these, *Le nozze di Figaro*, *Don Giovanni*, *Die Zauberflöte*, have maintained themselves to this day in the operatic repertory. Of the 40 symphonies only 3—those in G minor, E flat, and C (Jupiter)—are still heard. The other orchestral works include 31 divertissements and serenades (see DIVERTIMENTO; SERENADE), besides a considerable number of pieces in various forms (marches, dances, etc.). He also wrote 25 piano concertos, 6 violin concertos, and over 40 arias with orchestra. In the field of chamber music he left 26 string quartets, 7 string quintets, 2 piano quartets, 42 sonatas for piano and violin, and several other works for various combinations of instruments. The piano works comprise 5 sonatas (four-hand), 17 solo sonatas, and numerous smaller pieces. Among the master's Church music the first place belongs to the immortal *Requiem*. Of the masses published under his name 15 are genuine. It may be of special interest to note that of the so-called *Twelfth Mass*, which for a long time was the most popular, only the magnificent fugue, "Cum Sancto Spiritu," was composed by Mozart. His other sacred music consists of litanies, vespers, magnificats, and smaller works, among which the famous *Ave Verum* deserves special mention.

Mozart's complete works were published by Breitkopf and Härtel from 1876 to 1886.

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MOZDOK, mŏz-dŏk′. A town in the Caucasian Province of Terek, Russia, situated on the left bank of the Terek, 58 miles north of Vladikavkaz (Map: Russia, G 6). It has a number of Armenian and Greek churches, of which that of the Assumption attracts many pilgrims. The educational institutions include four Mohammedan schools. Gardening and the manufacturing of wine are the chief occupations. The town

was founded in 1762. Pop., 1897, 14,583; 1911, 17,068, consisting chiefly of Kabardins, Georgians, and other Caucasian tribes, Armenians, and about 4000 Russians.

MOZETTA, mō-tsĕt'tȧ. See COSTUME, ECCLESIASTICAL.

MOZIER, mō'zhĕr, JOSEPH (1812–70). An American sculptor. He was born at Burlington, Vt., and in 1831 settled in New York, where he established himself as a merchant. In 1845 he retired from business to devote himself to art and shortly afterward went to Italy. He studied sculpture for several years at Florence and then went to Rome, where he spent the greater part of his professional career. Among his best works are: "Esther"; "Wept of Wishton-Wish"; "Tacite" and "Truth," in the Mercantile Library, New York; "Pocahontas"; "Prodigal Son," in the Philadelphia Academy; "Rebecca," in the New York Public Library; "Il Penseroso," in Horticultural Hall, Fairmount Park, Philadelphia. Though often amateurish and deficient in modeling, these statues are interesting and show more originality and emotional power than the average sculpture of the day in America. "Rizpah," in the Metropolitan Museum, New York, is one of his latest and most mediocre works. He died at Faids, Switzerland.

MOZLEY, mōz'lĭ, JAMES BOWLING (1813–78). An English clergyman. He was born at Gainsborough, Lincolnshire, and was sent in early youth to school at Grantham. In 1830 he was admitted to Oriel College, where he came into intimate association with the leaders of the Oxford movement—Newman, Pusey, Keble, and Hurrell Froude. With this movement he became formally allied, though he was never among the more dogmatic of its promulgators. In 1834 he took his degree, and shortly thereafter won the Chancellor's prize for an English essay on "The Influence of Ancient Oracles on Public and Private Life." He remained at Oxford, studying theology under the direction of Pusey and Newman, as fellow of Magdalen, until 1865, during which period he contributed, first to the *British Critic* and later to the *Christian Remembrancer,* articles suggested by the Church movement of the time. He was in full accord with Anglican teachings until the Gorham controversy of 1850 on the subject of baptism led him to attempt a reconciliation of the Christian tradition about baptism with the teachings of Calvinistic theology. His contributions to this subject were: *A Treatise on the Augustinian Doctrine of Predestination* (1855); *The Primitive Doctrine of Baptismal Regeneration* (1856); *A Review of the Baptismal Controversy* (1862). (See GORHAM CONTROVERSY; GORHAM, GEORGE CORNELIUS.) He removed from Oxford on his marriage in 1856, and became rector of Old Shoreham, Sussex. In 1869 Gladstone appointed him canon of Worcester, and two years later nominated him regius professor of divinity at Oxford, which post he held until his death. In addition to the works already mentioned he published his Bampton lectures on *Miracles* (1865) and *Ruling Ideas in Early Ages* (1877). Consult Anne Mozley, *The Letters of J. B. Mozley* (London, 1885), and Paul Thureau-Dangin, in *The English Catholic Revival in the Nineteenth Century* (2 vols., ib., 1914). He was a brother of Thomas Mozley.

MOZLEY, THOMAS (1806–93). An English clergyman and journalist. He was born at Gainsborough and attended Charterhouse School. In 1825 he entered Oriel College, Oxford. He became fellow of Oriel and enjoyed the intimate friendship of the leaders of the Oxford movement, the personal side of which he has given in his *Reminiscences, Chiefly of Oriel College and the Oxford Movement* (1882). In 1831 he entered the active ministry, but returned to Oriel in 1835 to assume the office of junior treasurer. In 1836 he resigned his fellowship and became rector of Cholderton, Wiltshire, where he remained 11 years, varying his pastoral duties by writing for the *British Critic.* In 1841 he succeeded Newman as editor of that journal. In 1844 he began writing for the *Times* (London), and in 1847 he resigned his living and removed to London, formally entering upon a long literary career. From 1868 to 1880 the rectorship of Plymtree was his. The years 1869–1870 found him in Rome as correspondent for the *Times.* From 1880 to 1893 he resided at Cheltenham, engaged in literary pursuits. James Bowling Mozley was his brother.

MOZOOM'DAR, PRATAP CHANDRA (c.1840–1905). A Hindu reformer and theist. He was born at Calcutta, India, studied in the native college there, was led by conviction to join the Brahmo-Somaj (q.v.), and became the editor of the *Theistic Quarterly Review* and the *Interpreter,* published in Calcutta in the interests of the association. In 1874 he visited England, and in 1883 the United States, where he was welcomed by the leading men of several Christian denominations. During his stay he published a book entitled *The Oriental Christ,* and on his second visit he read a paper before the World's Parliament of Religions on the *Brahmo-Somaj,* published in Chicago, 1893. He is the author of *The Faith and Progress of the Brahmo-Somaj* (1882); *Life and Teachings of Keshub Chunder Sen* (1887); and has contributed also to British and American periodicals. His fame and influence were, however, far greater in England and America than they ever were in India.

MOZYR, mō-zēr'. A town in the Government of Minsk, Russia, situated on the right bank of the Pripet, 204 miles southeast of Minsk (Map: Russia, C 4). It manufactures leather, beer, and hardware, and trades in grain, animals, and lumber. Pop., 1897, 10,762; 1910, 10,729, including about 5000 Jews.

MPONGWE, m'pōn'gwĕ. A Bantu-speaking people living about the Gabun estuary, in French Equatorial Africa. They are often confused with the Pangve, a distinct group of tribes ranging between lat. 1° and 5° N. Formerly powerful, the Mpongwe have been broken up by the movements of other tribes, especially by the Fans. Missionary work has been carried on among the Mpongwe for a long time, and their language, which has been reduced to writing through these efforts, is peculiarly rich, so that it has been adopted by neighboring tribes, and thus forms a trade language. The Mpongwe are above the average height and well developed; their hair is woolly, and the skin of light chocolate color. In character they are boastful and indolent. Agriculture and trading are their chief pursuits. As merchants they are untrustworthy, being known as clever swindlers. The political unit is the clan, ruled over by the headmen. The so-called king is chosen from the headmen by lot in a solemn conclave, and is reviled and mistreated before being proclaimed.

In arts the Mpongwe are at a low level. They

are said to cook their food by boiling it in earthen vessels, apparently not being familiar with the method of roasting. As canoe makers they are skillful, and are admirable boatmen. The canoes, usually 60 feet long, are hollowed out by fire and transported often several miles to water. Around the stations the Mpongwe are nominally Christians, but the isolated natives retain their pagan religion, with its fetish idols, charms, and belief in witchcraft.

MRICCHAKATIKA, mrĭch'ä-kä'tē-kä' (Skt. *mrcchakaṭikā*, clay cart). The title of a Sanskrit play of the sixth century attributed to a king named Śūdraka, but probably written for him by the poet Dandin (q.v.). The play, which is in 10 acts, is one of the most exquisite of all the Sanskrit dramas and is noteworthy for its vigor, life, and action. The scene is laid at Ujjain (q.v.), and its central theme is the noble love of the rich courtesan Vasantasenā for a merchant named Charudatta, who has been reduced to poverty. The *Mricchakatīkā* has been edited by Stenzler (Bonn, 1847), Codabole (Bombay, 1896), Vidyasagara (2d ed., Calcutta, 1891), and Parab (Bombay, 1900). It has been translated into German by Böhtlingk (St. Petersburg, 1877), Fritze (Chemnitz, 1879), and Kellner (Leipzig, 1894); into Dutch by Vogel (Amsterdam, 1897); into Swedish by H. Anderssen (Lund, 1826); into French by Fauche (1861) and Regnaud (1876–77); into Italian by Kerbaker (1908); and into English by Wilson in *Select Specimens of the Theatre of the Hindus* (3d ed., London, 1871) and Ryder (Cambridge, Mass., 1905). Consult Lévi, *Théâtre Indien* (Paris, 1890); Chaṭṭopādhyāya, *Mricchakatīkā, or The Toy-Cart of King Śūdraka: A Study* (Mysore, 1902); Gawrónski, *Sprachliche Untersuchungen über das Mricchakatīkā und das Daśakumāracarita* (Leipzig, 1907); Bartoli, *Il caretto d' argilla* (Bari, 1909). For bibliography, consult Montgomery Schuyler, *Bibliography of the Sanskrit Drama* (New York, 1906).

MUALLAKAT. See MOALLAKAT.

MUCHA, mụ'shä', ALPHONSE MARIE (1860–). An Austrian decorative painter and illustrator. He was born at Ivancia (Moravia) and studied at the Munich Academy, at Vienna, and in Paris, chiefly under J. P. Laurens, who strongly influenced him. He started in Paris as an illustrator, but first attracted wide attention by his poster of Sarah Bernhardt as "Gismonda." Later he designed posters for her in all her great rôles, achieving special success with his "Medea." All his work in this line is distinguished by originality of design, richness of color, skillful use of mosaic backgrounds, and a wealth of decorative detail. His decorative panels, including a series of the "Four Seasons," and his cartoons for stained-glass windows possess great charm and individuality. He also takes a high rank as an illustrator of such works as Seignobos' *Scènes et épisodes d'Allemagne* and Robert de Fler's *Ilsée*. He contributed frequently to *L'Illustration*, *Le Monde Illustré*, and other periodicals, and became a Chevalier of the Legion of Honor. Consult *Alphonse Mucha et son œuvre* (Paris, 1897).

MUCH ADO ABOUT NOTHING. A comedy by Shakespeare, produced in 1597–98 and printed in 1600. It was probably a recast of *Love's Labour's Won* (1590), and was known as *Benedick and Beatrice* (1613). The story of Hero and Claudio is taken probably from the tale of "Ariodante and Ginevra" in Ariosto's *Orlando furioso*, which was translated by Beverly and dramatized as *Ariodante and Geneuora* (1582). It is found also in Bandello's novels and in a German play by Jacob Ayrer, *The Beautiful Phœnician* (1596). This contains some features not in the novel but used by Shakespeare, pointing to some unknown intermediate source. Otherwise the comedy is quite original, especially the inimitable Dogberry.

MU'CILAGE (Lat. *mucilago*, moldy, musty juice, from *mucere*, to be moldy, from *mucus*, slime). A name applied to aqueous solutions or jelly-like preparations of vegetable gums or of dextrin (q.v.). Distinction was made formerly between solids exuding from plants, such as gum arabic or gum tragacanth, and solutions made by extracting plants, as quince, marshmallow, etc. The United States Pharmacopœia contains four mucilages, including *Mucilago acaciæ* and *Mucilago tragacanthæ*. See CEMENT.

MU'CIN. See MUCOUS MEMBRANE.

MUCIUS SCÆVOLA, mū'shĭ-ŭs sĕv'ô-lä. See PORSENA.

MUCK, mụk, KARL (1859–). A German opera and concert conductor, born at Darmstadt. He was intended for a professional career and studied at Heidelberg and Leipzig. While at Leipzig he also attended the Conservatory. After a successful début as pianist at the Gewandhaus (1880), he turned his attention entirely to music, becoming conductor at Salzburg. After some minor engagements he attracted attention through his work at the opera at Prague (1886–92). In 1892 he became one of the conductors of the Berlin Royal Opera, alternating with Richard Strauss. At the same time he frequently directed at Bayreuth, and was in great demand as guest conductor in all the principal cities of Europe, both in opera and concert. From 1906 to 1908 he was conductor of the Boston Symphony Orchestra. Although the management would gladly have retained him longer, he was obliged to return to Berlin, as the Emperor refused to extend his leave of absence. In 1912 he obtained a definite release from his duties at the Royal Opera and assumed the regular conductorship of the Boston orchestra.

MUCK'ERS (Ger. *Mucker*, sulky person, hypocrite). The popular but opprobrious name, meaning that they were hypocrites, of an extraordinary sect which sprang up at Königsberg in Germany in 1835. The movement seems to have originated in the dualistic and Gnostic views of John Henry Schönherr (1770–1826) concerning the origin of the universe by the combination of a spiritual and a sensual principle. His followers carried out his system much more completely than himself. The most notable of them were two clergymen, Johann Wilhelm Ebel and Georg Heinrich Diestel, the former an archdeacon, who founded a society to which women—some of noble birth—attached themselves. Scandal was thereby caused, and Ebel's easily misunderstood expressions as to the proper relations of the sexes were made the basis of charges against his chastity and moral influence. His followers were accused of the grossest immorality, and a garden in Königsberg where they met acquired the name of the Seraph's Grove. The subject was brought before the courts (1839–42), and the result was that Ebel and Diestel were degraded from their offices, and the latter was further punished by

imprisonment. But the sentence was dictated by strong prejudice against the accused, on account of their religious views and peculiar eccentricities, and the evidence gives no support whatever to the charge of licentiousness. The matter was revamped without proper examination by W. Hepworth Dixon in his *Spiritual Wives* (London, 1868), and thus rendered familiar to English readers. For the facts consult J. I. Mombert, *Faith Victorious*, a life of Ebel (New York, 1882). See AGAPEMONE.

MUCKLESHOOT. See SALISHAN STOCK.

MU'CORA'CEÆ (Neo-Lat. nom. pl., from Lat. *mucor*, mold, from *mucere*, to be moldy, from *mucus*, slime; connected with Gk. *μύξα*, *myxa*, mucus, Skt. *muc*, to release). A family of the Mucorales (q.v.), which is an order belonging to the Zygomycetes (q.v.), one of the two groups of Phycomycetes (q.v.). The Mucoraceæ include the best-known black molds, and are among the most common of the saprophytic fungi. The characteristic cobwebby, fleecy-white mycelium, composed of large, often glistening, profusely branched filaments (hyphæ), is very common on decaying material, stale bread (kept moist and warm), fruits and fruit juices, etc. The ordinary form on stable manure is *Mucor mucedo*, while the common bread mold is *Rhizopus nigricans*. The cobweb-like mycelium produces erect branches (sporophores) which terminate in globular sporangia (spore cases), the spores and stalk being dark or even black, suggesting the name black mold. Sexual reproduction occurs under special conditions, when suitable individuals are brought together, for it has been found that the mycelia are sexually differentiated, although the two sexes cannot be distinguished. Fertile branches are developed by the pairing individuals, come into contact tip to tip, and a terminal cell is cut off by each. These two abutting cells fuse, and a zygote (fertilized egg) is the result. *Pilobolus*, the squirting fungus, is also a member of this family, occurring on stable manure and resembling *Mucor*, but remarkable for its method of discharging spores. The sporophore becomes much swollen just beneath the sporangium, and finally bursts, hurling the sporangium with considerable force.

MUCORALES, mū'kō-rā'lēz. One of the two orders of Zygomycetes (q.v.), which in turn is one of the two groups of Phycomycetes (q.v.). The plants of this order are commonly known as black molds, among which are many of the most common saprophytic fungi. Among the families of Mucorales are the Mucoraceæ (q.v.), the best-known black molds. The other order of Zygomycetes is the Entomophthorales (q.v.), a group of parasites fatal to insects.

MU'COUS MEMBRANE and **MU'CUS.** The mucous membrane is continuous with the skin at all the orifices of the body and lines the passages by which the internal organs communicate with the outer world. For convenience of description the mucous membrane may be divided into three great tracts—the alimentary, the respiratory, and the genitourinary.

The *alimentary mucous membrane* commences at the lips and not only forms the inner lining of the intestinal canal from the mouth to the anus, but gives off prolongations which after lining the ducts of the various glands (the salivary glands, the liver, and the pancreas) whose products are discharged into this canal, penetrate into the innermost recesses of these glands and constitute their true secreting element. Besides these larger offsets we find in the stomach and small intestine an infinite series of minute tubular prolongations, the anatomical arrangement and function of which are described under DIGESTION, ORGANS OF.

The *respiratory mucous membrane* begins at the nostrils and under the name of *Schneiderian* or *pituitary membrane* (see NOSE) lines the nasal cavities, from whence it sends on either side an upward prolongation through the lachrymal duct to form the *conjunctiva* of the eye; backward, through the posterior nares (the communication between the nose and the throat), it sends a prolongation through the Eustachian tube to the middle ear (the cavity of the tympanum), and is continuous with the pharyngeal mucous membrane (which is a portion of the alimentary tract); it then, instead of passing down the œsophagus, enters and forms a lining to the larynx, trachea, and bronchial tubes to their terminations.

The *genitourinary mucous membrane* commences at the genitourinary orifices, lines the excretory passages from the generative and urinary organs, and is the essential constituent of the glands of both. In the female it becomes continuous with the serous membrane of the abdomen at the fimbriæ of the Fallopian tubes. See KIDNEY.

Mucous membranes line all those passages by which internal parts communicate with the surface and by which matters are either admitted into or eliminated from the body. As a general rule they are soft and velvety, and of a more or less red color, from their great vascularity; but they present certain structural peculiarities according to the functions which they are required to discharge. In all the principal parts of the mucous tracts we find the mucous membrane presents an external layer of epithelium (q.v.) resting on a thin, transparent, homogeneous membrane, which from its position is termed the basement membrane, and beneath this a stratum of vascular tissue of variable thickness, which usually presents either outgrowths in the form of papillæ and villi, or depressions or inversions in the form of follicles or glands, or both. The follicles are almost invariably present, but the papillæ and villi are limited to the alimentary or gastrointestinal mucous membrane. The mucous membranes constitute the medium through which are effected nearly all the material changes that take place between the living organism and the external world. Thus, in the gastrointestinal mucous membrane we find a provision for reducing the food by means of a solvent fluid poured out from its follicles; while the villi, which are closely set upon the surface of the small intestine, are specially adapted to absorb the nutrient materials thus reduced to the liquid state. The same membrane, at its lower part, constitutes an outlet through which are cast out not merely the indigestible residuum of the food, but also the excretions from numerous minute glands in the intestinal wall. Again, the respiratory mucous membrane serves for the introduction of oxygen from the air and for the exhalation of water and carbonic acid. And, lastly, the mucous membranes are continuous with the cell-lined vesicles or tubes of the various glands, which are the instruments whereby their respective products are separated from the blood.

Mucus. Although the various kinds of epi-

thelial cells discharge a special office in relation to the peculiar function of the mucous membrane upon which each kind occurs, yet they all serve one general purpose—viz., that of protecting the surfaces on which they are placed. This protecting power is increased by the presence of the secretion known as *mucus*, which ordinarily forms an extremely thin layer on these membranes, but when they are irritated or inflamed is secreted in very considerable quantity. (See CATARRH.) The exact mode of its formation is still a disputed question, but it is generally believed to be the product of the gradual solution of the uppermost epithelial cells. Besides acting both mechanically and chemically as a shield to highly sensitive membranes, mucus has other uses, among which two may be especially mentioned: (1) it communicates to the salivary, and probably to other, glands properties which are not possessed either by itself or by the pure glandular secretions; and (2) it serves to eliminate a considerable quantity of nitrogen from the system.

Mucin. This nitrogen is contained in the *mucin*, which forms from 2.4 to 9 per cent of nasal and bronchial mucus. This mucin contains 12.64 per cent of nitrogen, and is the substance which gives to mucus its viscid and tenacious character. Normal mucus is devoid of smell and taste and is faintly alkaline in reaction.

MUCU'NA. A genus of leguminous plants. See COWAGE; LUMBRICOID.

MUCUS. See MUCOUS MEMBRANE.

MU'DAR (Hind. *madār*, from Skt. *mandāra*, coral tree), *Calotropis*. A genus of East Indian shrubs of the family Asclepiadaceæ. The bark of the root and the thick milky juice of some species are used in the East, where they have long been credited with alterative, purgative, emetic, and sudorific properties which have attracted some attention from European physicians. Mudar is a very common and often troublesome weed in India. The commonest species, *Calotropis gigantea*, a large shrub, with stems often thicker than a man's leg, and broad, fleshy leaves, rapidly attains a large size on very dry sands, where almost nothing else will grow. The short, not easily spun, silky down of the pods is used for making floss and a soft, cotton-like thread. A strong fibre, useful for cordage and fishing lines, is obtained from the inner bark. When properly prepared it is especially well adapted to mix with various other fibres, especially silk. The thick, milky juice, collected by making incisions in the bark, is used as a substitute for caoutchouc and gutta-percha. It becomes flexible when heated. *Calotropis procera* occurs as a low tree in the Sahara. Its fruit is said by some to be the apple of Sodom of the Bible. See SODOM, APPLE OF.

MUD CAT. See CATFISH.

MUD DAUBER. See MUD WASP.

MUD EEL. A siren. See MUD PUPPY.

MUDFISH. A name given to several widely different fishes which frequent muddy waters. 1. In the United States, the bowfin (q.v.). 2. In California, a small marine goby (*Gillichthys mirabilis*) which lives in shallow places that are left bare at low tide and harbors in excavations made by itself in the mud. 3. One of the killifishes (see KILLIFISH), the mummichog, or mud dabbler. 4. Any of the lungfishes or dipnoans, especially the rare *Lepidosiren paradoxa* of Brazilian swamps. (See DIPNOI, and Plate of DIPNOI AND CHIMÆRA.) This is a salamander-like creature which grows to a length of 4 feet or more, has the dorsal, caudal, and anal fins united into one continuous fin and the pectoral and ventral fins produced into long jointed filaments. The head is conical, eye small, gill openings without covers, mouth small, and teeth pointed and cusped, adapted to crushing the fresh-water snails (chiefly *Ampullaria*) upon which it feeds. A closely related west African fish (*Protopterus annectans*), sometimes 6 feet long, is very abundant in the Gambia River, where it sustains a torpid existence during the dry season by burying itself in the mud, forming a sort of nest or case of hardened mud about it. Many specimens have been dug out and sent, each within its clod, to Europe, and kept alive in zoölogical gardens. They grow rapidly, are active and voracious the year round, when kept in tanks in hothouses feed upon flesh and all sorts of small animals, and frequently eat each other. In the wet season they swim and crawl about the muddy rivers they inhabit, and are sought as food by the natives. They are nocturnal and frequently rise to the surface to breathe. Their breeding habits are little known, but they are believed to be ovoviviparous. The young have external gills. Consult Richard Lydekker, *Royal Natural History*, vol. v (London, 1895).

MUD'FORD, WILLIAM (1782–1848). An English writer, who as editor of the London *Courier*, for a time the rival of the *Times*, exerted great influence on public opinion. Leaving the *Courier*—which declined in influence after his withdrawal and presently was discontinued—he became editor and proprietor of the *Kentish Observer*, the organ of the Conservative party in Kent. In 1841 he succeeded Theodore Hook as editor of *John Bull*. To *Blackwood's Magazine* he contributed many essays and tales, afterward collected in part. Among his published volumes are: *A Critical Enquiry into the Writings of Dr. Samuel Johnson* (1803); *Nubilia in Search of a Husband* (1809); *The Contemplatist* (1811), essays; *An Historical Account of the Campaign in the Netherlands in 1815* (1817); *Tales and Trifles from Blackwood's* (1849).

MUDGE, ENOCH (1776–1850). The first Methodist minister reared in New England. He was born at Lynn, Mass., was converted under Jesse Lee, the pioneer of Methodism in New England, and entered the ministry in 1793. He labored as an itinerant preacher in Maine until 1799, when his health gave way and he was forced to retire. He was twice chosen State Representative and had much to do with the passage of the Religious Freedom Bill. In 1816 he resumed preaching. From 1832 to 1844 he was pastor of the Seaman's Chapel at New Bedford, Mass.

MUDGE, JAMES (1844–). An American Methodist Episcopal clergyman and writer, nephew of Zachariah Mudge. He was born at West Springfield, Mass., and graduated from Wesleyan University in 1865 and from Boston University School of Theology in 1868. The same year he entered the ministry, joining the New England conference. While a missionary in India from 1873 to 1883 he edited the Lucknow *Witness*. After his return he was pastor of churches in Massachusetts until 1908, serving also as lecturer on missions at the Boston

University School of Theology. In 1889 he became secretary of the New England conference. He wrote: *Memorial of Rev. Z. A. Mudge; Historical Sketch of the Missions of the Methodist Episcopal Church* (1877); *A Defense of Christian Perfection* (1896); *The Best of Browning* (1898); *The Life Ecstatic* (1906); *Fénelon the Mystic* (1906); *The Riches of His Grace* (1909); *History of the New England Conference* (1910); *The Perfect Life in Experience and Doctrine* (1911); *Hymns of Trust* (1912); *Religious Experience Exemplified in the Lives of Illustrious Christians* (1913). For many years he was book editor of *Zion's Herald*.

MUDGE, THOMAS HICKS (1815–62). An American Methodist Episcopal clergyman, born at Orrington, Me., the son of Enoch Mudge. He graduated from Wesleyan University in 1840 and from Union Theological Seminary in 1843, and then entered the ministry, joining the New England conference. After several pastorates in New England he became professor of sacred literature in McKendree College, Lebanon, Ill., serving from 1857 to 1859. Later he held pastorates in St. Louis, Mo., and Baldwin, Kans.

MUDGE, ZACHARIAH ATWELL (1813–88). An American Methodist Episcopal clergyman and author, nephew of Enoch Mudge. He was born at Orrington, Me., and was educated at Wesleyan University. He entered the ministry in 1840 and held various pastorates in Massachusetts. For three years he was editor of the *Guide to Holiness*. He was the author of *Memoir of Cyrus Shepherd* (1848); *Views from Plymouth Rock* (1861); *The Christian Statesman: A Portraiture of Sir Thomas Fowell Buxton* (1865); *The Forest Boy: The Sketch of the Life of A. Lincoln* (1867); *Footprints of Roger Williams* (1871); *Arctic Heroes* (1875); *North Pole Voyages* (1875); *An Easy Lesson Book for Infant Scholars*, the sale of which reached into the hundred thousands. It was translated into the Urdu language by James Mudge, who also wrote a *Memorial* of his uncle.

MUD HEN. A variant of marsh hen, some species of coot, gallinule, or rail (qq.v.).

MUDIE, mŭ'dĭ, CHARLES EDWARD (1818–90). The founder of the famous Mudie's Lending Library, London, and a publisher. He was born at Chelsea and established himself in 1840 in London as a stationer and bookseller. In 1842 he commenced his lending library and, by a shrewd understanding of the needs and tastes of his public and by extensive advertising, fostered its growth and established several branches. In 1864 Mudie's became a limited company. Among the books he published may be noted the first English edition of James Russell Lowell's poems. A volume of Mudie's own verse appeared in 1872.

MUD MINNOW. A small, minnow-like fish of the family Umbridæ, closely allied structurally to the pikes. They inhabit weedy streams, bogs, and ditches in the United States, and also in Austria, where they bury themselves in the mud. They are carnivorous, and extremely tenacious of life. Often when none can be seen in a pool a swarm of these little dark-green fishes may be aroused by raking through the mud. Two American species are known, the Eastern mud minnow (*Umbra pygmæa*) and the Western dogfish (*Umbra limi*).

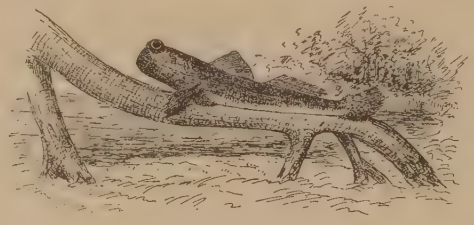
MUD PUPPY, or WATER DOG. An American salamander of the family Proteidæ, characterized by having four toes on each foot and persistent larval gills. This genus was formerly called *Menobranchus*. Two species inhabit the central parts of the United States, of which the more common and widespread is *Necturus maculatus*. It reaches the length of 1 foot, is smooth, slimy, and brown-blotched, with the

A MUD PUPPY.

tufted gills dark red. These creatures remain mostly among weeds or rocks at the bottom of the water during the daytime, but at night they move about, often with quick eellike motions (a local name is mud eel), in search of crayfish, worms, insects, frogs, etc. They spawn in April or May. Other salamanders are sometimes given the same name, especially the axolotl (q.v.).

MUD SHAD. A useless shadlike fish (*Dorosoma cepedianum*), called also "gizzard" and "hickory" shad, which is abundant all along the coast from Cape Cod to Mexico and also throughout the Mississippi valley. It grows to a length of about 15 inches and is bluish silvery, the young having a round dark spot at the shoulder. See Plate of HERRING AND SHAD.

MUDSKIPPER. One of the curious little fishes (3–4 inches long) of the goby family and genus *Periophthalmus*. They are sometimes called jumping fishes or leaping fishes and abound on the coasts of west Africa, the Red Sea, Indian Ocean, and eastward to Japan. Their remarkable peculiarity is that they will leave the water to visit every place washed by the surf. By the aid of the pectoral and ventral fins and the gill covers these fishes skip across the damp sand, ascend the roots of mangroves, and run up wet rocks in quest of flies. They are, says Day, essentially mud-dwelling fishes, dark brown in color, and if placed in a vessel of



A MUDSKIPPER.

deep clear water will drown. This amphibious power of these fishes has been acquired without any essential change in the character of the gills; but the fish is in the habit when out of water of puffing out its cheeks with air, which is held for a short time and then renewed. Consult Day, *Fishes of India* (London, 1878), and Karl Semper, *Animal Life as Affected by Natural Conditions of Existence* (New York, 1881).

MUD SUNFISH. A small bass (*Acanthar-chus pomotis*) of little value as food, numerous in sluggish coastal streams from New York to South Carolina. It is dark green in color, with five indistinct blackish stripes lengthwise and a black opercular spot.

MUD TORTOISE, or MUD TURTLE. A dark-brown turtle (*Cinosternum pennsylvanicum*) with light dots on the head, found from Canada to Texas. See TERRAPIN.

MUD WASP, or MUD DAUBER. Any one of a group of wasps belonging to the old genus *Pelopœus*, now *Sceliphron*. They build nests of mud in sheltered places, choosing the cracks of a barn or fence or some sheltered place under the eaves of any wooden building, entering also disused rooms in houses, and sometimes even rooms that are in daily use. The nests consist of a varying number of mud cells placed side by side, usually in a single row, but sometimes in several rows. The cells before completion are packed with a food supply for the future young, and this consists almost invariably of spiders, as many spiders being placed in one cell as the cell will hold. A single egg is laid upon the last spider which has been placed in the cell, and the larva hatching from the egg eats rapidly, consuming the abdomens of the spiders first and subsequently the remainder of their bodies. All of the spiders which have been placed in the cell have been stung and paralyzed by the parent wasp, but many of them are not really dead when the larva reaches them. After the egg is laid and the nest is closed up, new cells are constructed by the same female. The mud or clay with which the nests are constructed is brought in little balls by the aid of the wasp's mandibles, and 20 or more visits are required to complete one cell; so that for the construction of a large nest of 50 cells about 1000 visits must be made by the insect. The larva reaches full growth in a short time, usually 10 days or two weeks, and forms a cocoon within the mud cell, the winter being passed in the cocoon, although there may be two or more summer generations, in which case the summer pupal period is short. The group is a large one, and mud wasps are common not only in America and in Europe, but in India and Australia. Consult: J. H. Fabre, *Insect Life* (London, 1901); David Sharp, in *Cambridge Natural History*, vol. vi (ib., 1901); L. O. Howard, *The Insect Book* (New York, 1914). See also the article WASP and its bibliography.

MUET, mụ'ā', PIERRE LE (1591–1669). A French architect, born at Dijon. He is chiefly noted for his work on the beautiful church of the Val-de-Grâce in Paris, whose construction he superintended from 1655 to 1666 as successor to Jacques Lemercier (q.v.). He published in 1623 *Manière de bien bâtir pour toutes sortes de personnes.*

MUETTE DE PORTICI, mụ'ĕt' de pôr'tê-chē, LA (Fr., The Dumb Girl of Portici). An opera by Auber (q.v.), first produced at Paris, Feb. 29, 1828; in the United States, Nov. 28, 1831 (New York).

MUEZZIN, mû-ĕz'ĭn, or **MUED'DIN** (Ar. *mu'adhdhin*, one who calls to prayer, from *'adhdhana*, to call to prayer, from *'adhina*, to hear). The Arabic name of the Mohammedan official attached to a mosque, whose duty it is to announce the different times of prayer. His chant (*'adhān*) consists of these words, repeated at intervals: "Allah is great [four times]. I testify that there is no God but Allah [two times]. I testify that Mohammed is the apostle of Allah [two times]. Come to prayers [two times]. Come to salvation [two times]. There is no god but Allah." The Shiites also say "Come to good works," and "Prayers are better than sleep" is added before the early morning prayer (*fajr*). Besides these regular calls, two more are chanted during the night for those pious persons who wish to perform special nightly devotions. In small mosques the *'adhān* is chanted by the imam, and, when the mosque is provided with a minaret, the muezzin ascends it for his chant; in smaller mosques, the chant is made at the side. The office of muezzin is considered a meritorious one, and insures the holder's admission into Paradise.

MUFTI, mŭf'tē (Ar. *muftī*, expounder of the law). The name of a Mohammedan official who expounds the law according to the Koran and traditions; according to his decision, delivered in a memorandum called a fetwa, the cadi, or judge, decides the case. In Turkey the grand mufti, or *Sheikh al Islam*, is appointed by the Sultan. He is the supreme chief of the ulemas, or body of Mohammedan theologians. His fetwa is extremely powerful—even under certain circumstances may depose the Sultan. It is through him that the jihad, or holy war, is proclaimed, as was done by the fetwa published in the *Tanin*, Nov. 15, 1914. The title mufti is also applied to jurisconsults attached to local government councils in the Turkish Empire, but the power of the muftis, with the exception of the grand mufti, is largely nominal.

MÜGELN, HEINRICH VON. See HEINRICH VON MÜGELN.

MÜGGE, mụg'ge, THEODOR (1806–61). A German novelist, born and educated in Berlin. His liberal sentiments, expressed in various newspapers and in such pamphlets as *Die Censurverhältnisse in Preussen* (1845), led in several instances to his arrest and prosecution. During the 20 years preceding his death he wrote numerous sketches, tales, novels, and romances. Several, including *Toussaint* (1840) and *Afraja* (1854), have been translated into English by E. J. Morris. Among the most interesting of his writings are his Norwegian romances and sketches of travel: *Leben und Lieben in Norwegen* (1858); *Skizzen aus dem Norden* (1844); *Nordisches Bilderbuch* (1858; 3d ed., 1862). A complete edition of his novels was published in 33 volumes (Breslau, 1862–67). Consult the *Allgemeine deutsche Biographie*, vol. xxii (Leipzig, 1885).

MUGGER. The common marsh crocodile of India and the Malay islands (*Crocodilus palustris*). It is not often more than 12 feet in length. Its head is rough, with a thick and rather broad snout, and each jaw contains 19 teeth on each side. It inhabits rivers, ponds, tanks, and marshes, and goes ashore only when it is obliged to move into some new water by the drying up of its pond, or wishes to bury its eggs in the sand. In extreme drought, however, it buries itself in the mud and remains dormant until the coming of the rains. This is the crocodile which is venerated by the Hindus and is kept in a half-domesticated condition in certain ponds, attended by fakirs, who worship in a neighboring temple of their cult. Consult the writings of Indian naturalists, especially Sir J. E. Tennent, *Sketches of the Natural History of Ceylon* (London, 1861); A. L. Adams, *Wanderings of a Naturalist in India* (Edinburgh, 1867); W. T. Hornaday, *Two Years in the Jungle* (7th ed., New York, 1901).

MUG'GLETO'NIANS. A sect that arose in London about the year 1651. The founders were

two cousins, John Reeve (1608–58) and Lodowicke Muggleton (1609–98), obscure journeymen tailors, claiming to have the spirit of prophecy. Muggleton professed to be the "mouth" of Reeve, as Aaron was of Moses. They affirmed themselves to be the two witnesses of Revelation xi. They asserted a right to curse all who opposed them, and did not hesitate to declare eternal damnation against their adversaries. They denied the doctrine of the Trinity; held anthropomorphist opinions about the Deity; and to all this added many strange doctrines of their own, as that the devil became incarnate in Eve, etc. *The Complete Works of Reeve and Muggleton* were published in London (1756; reprinted, 1832). The sect lasted until the middle of the eighteenth century. Consult Gordon, "The Origin of the Muggletonians" and "Ancient and Modern Muggletonians," in the *Transactions of the Liverpool Literary and Philosophical Society* for 1869–70.

MUGNONE, mōō-nyō'nā, Leopoldo (1858–). An Italian orchestral conductor, born at Naples. He received his musical education at the Conservatory of his native city, and began the usual career of an Italian operatic conductor. When he became acquainted with Wagner's works, he saw that he had found a task worthy of his unusual gifts. From that time on he was, together with Mariani (q.v.), the most active apostle of the new style, which everywhere met with opposition. His excellent work at the Costanzi Theatre in Rome made him famous, and attracted the attention of Verdi, who, in 1892, chose him to direct the first performance of *Falstaff*. Together with Mariani, Mugnone is to be regarded as the founder of interpretative conducting in Italy. As a composer he is unimportant. His work in this field comprises three operas: *Don Bizarro e le sue figlie* (1875), *Il Birichino* (1892), *Vita Brettona* (1905).

MUGWORT. A popular name for various species of *Artemisia* (q.v.).

MUGWUMP (Algonquin *mugquomp*, chief, great man). In American politics, a term originally applied to a voter nominally identified with a particular party, but claiming the right to vote with another party. It early passed into the local phraseology of some of the New England villages, being applied in its original (Indian) signification to any local magnate. Its first appearance in print seems to have been in the Indianapolis *Sentinel* in 1872. Its popular use began with an article in the New York *Sun* for March 23, 1884. In September of the same year it was first given to a political party, the Independent Republicans, who refused to ratify the nomination of James G. Blaine for the presidency. The name was applied to them in a spirit of derision, but was accepted by them, and now regularly denotes any body of voters who profess to be independent of strict party obligations. The name Dudes and Pharisees was also applied in 1884 to those Republicans who opposed the election of James G. Blaine. As since adopted in England, it usually means one who stays neutral and votes for no party.

MUHAR'RAM (Ar. *muharram*, sacred, from *harama*, to forbid). The first month of the Mohammedan year. Originally the Arabs had a solar year by means of intercalary months. The first month was called *Safar I* and came in the autumn. It was the month of fairs, pilgrimages, and festivals, and hence acquired the epithet *al Muharram*, the sacred, which in time supplanted the real designation. When in the year 10 of the Hejira Mohammed restored the lunar year, on the ground that intercalary months were an impious interference with the order of things as established by God, Muharram and all the months began to come earlier in each succeeding year. Mohammed is said to have observed the tenth day of Muharram (the *'ashūrā*) as a fast day, perhaps in imitation of the Jewish Day of Atonement on the tenth of Tishri. Later he appointed the month of Ramadan (q.v.) for fasting. The Sunnites still consider the tenth of Muharram as sacred, and keep it as a fast. The Shiites lament the death of Husain on the first 10 days of the month. See Hasan and Husain. Consult Julius Wellhausen, *Reste arabischen Heidenthums* (2d ed., Berlin, 1897).

MÜHLAU, mu̇'lou, Ferdinand (1839–1914). A German biblical scholar. He was born in Dresden, was educated at Leipzig and Erlangen, and in 1869 became docent at the latter university. From 1870 to 1895 he was professor of exegesis at Dorpat and then, until his retirement in 1909, of New Testament exegesis at Kiel. Among his published works are: *Geschichte der hebräischen Synonymik* (1861); *De Proverbiorum quæ Dicuntur Aguri et Lemuelis Origine et Indole* (1869); *Besitzen wir den ursprüngliche Texte der heiligen Schrift?* (1884); a text of Genesis without points, with Kautzsch (4th ed., 1904); a revision of Gesenius' lexicon, with Volck (1886, 1890); *Zur paulinischen Ethik* (1898).

MÜHLBACH, mu̇l'bȧḥ, Luise. The assumed name of Klara Mundt (1814–73), wife of Theodore Mundt, an author of the Jungdeutschland school. A German author, born in Neubrandenburg. Her very numerous works, consisting mostly of historical novels, are sensational, inartistic, distorted, but show a talent for lively description and narration that gave her a wide but short-lived popularity. *Friedrich der Grosse und sein Hof* and many others of her novels have been translated into English.

MÜHLBERG, mu̇l'bĕrk. A town in the Province of Saxony, Prussia, on the Elbe, 35 miles northwest of Dresden (Map: Prussia, E 3). It manufactures sugar, bricks, and lumber. It is famous as the scene of a battle in 1547, which resulted in the defeat of the Protestants under John Frederick I, Elector of Saxony, by the Emperor Charles V, and the triumph of the Catholics in Germany. Pop., 1900, 3463; 1910, 3345.

MÜHLEISEN-ARNOLD, mu̇l'ī-zen-är'nold, John (1817–81). An English clergyman, missionary, and author, born at Zell (Württemberg). He was educated in Germany and after his removal to England was successively missionary of the Church Missionary Society in India and Abyssinia, chaplain to the Bishop of Gibraltar, and chaplain to St. Mary's Hospital, Paddington, London (1852–61). In 1859 he founded the Moslem Mission Society in England. He was chaplain of East Ham, Essex, from 1861 to 1865, consular chaplain at Batavia, Java, from 1865 to 1871, and rector of St. Mary's Church, Papendorf, Cape Town, South Africa, from 1876 until his death. His publications include: *Ishmael; or, A Natural History of Islamism* (1859); *English Biblical Criticism, and the Authorship of the Pentateuch, from a German*

Point of View (2d ed., 1864); *Genesis and Science; or, The First Leaves of the Bible* (2d ed., 1875).

MUHLENBERG, mū'len-bĕrg, FREDERICK AUGUSTUS CONRAD (1750–1801). An American clergyman and politician, son of Heinrich Melchior Muhlenberg. He was born at New Providence (now Trappe), Montgomery Co., Pa., studied in Germany at the University of Halle, and upon his return to America entered the Lutheran ministry in Pennsylvania. In 1773–76 he was pastor of a Lutheran church in New York City. He was an ardent patriot, and in 1776 he quitted New York and returned to his native State, at the same time abandoning the work of the church for political activity. He was elected to the Continental Congress in 1779. He was also a prominent member of the Pennsylvania Legislature and was twice Speaker of that body. The first session of the House of Representatives in Washington's administration chose him as Speaker, an office which he twice filled. He was also made chairman of the Committee of the Whole in 1795, and cast the deciding vote that saved the Jay Treaty (q.v.).

MUHLENBERG, GOTTHILF HEINRICH ERNST (1753–1815). An American clergyman and botanist, son of Heinrich Melchior Muhlenberg, born at Trappe, Pa. He was educated at Halle and traveled in Germany and in England. He was ordained a Lutheran minister and became assistant pastor of a Lutheran church in Philadelphia. In 1779 he retired to the country, where he devoted himself to the study of botany; and it is as a botanist that he is best known. A well-known genus of grasses (*Muhlenbergia*) was named in his honor. His chief works are *Catalogus Plantarum Americæ Septentrionalis* (1813) and *Descriptio Uberior Graminum et Plantarum Calamariarum Americæ Septentrionalis Indigenarum et Cicurum* (1817).

MUHLENBERG, HEINRICH MELCHIOR (1711–87). The founder of American Lutheranism. He was born at Eimbeck, Prussia, Sept. 6, 1711. His parents were Saxon, but, having suffered greatly in the Thirty Years' War, removed to Eimbeck. The death of his father in his twelfth year threw the family into poverty and occasioned an interruption of his studies, and till his twenty-first year he toiled incessantly to assist in the support of the family. In 1735 he entered the University of Göttingen, where he remained three years. Graduating at Göttingen, he went to Halle in 1738, where, besides studying, he taught in the orphan house. He associated intimately with Francke, Cellarius, and Fabricius. Soon after his ordination application came to Germany from Pennsylvania for some one to be sent to labor among the destitute Lutherans of that colony. The faculty selected Muhlenberg, who was then in his thirty-first year. He accepted the appointment, and the better to qualify himself went to London, where he acquired facility in the use of English. He reached America in 1742, to the great joy of the German Christians. His arrival marked a new era in the history of the Lutheran church in the United States. He took the pastoral care of the associated churches of Philadelphia, New Hanover, and New Providence (now Trappe, some 25 miles northwest of Philadelphia), which had united in calling a minister, and these three congregations were the principal scenes of his ministerial labors. At his request more ministers came from Halle, and his oversight of the Lutheran churches extended from Georgia to New York. The first three years of his ministry he resided in Philadelphia, the next 16 in New Providence. In 1761 he removed to Philadelphia, but in 1776 went back to New Providence. During the War of the Revolution his sympathy with the colonists excited great opposition, and his life was often in peril. Consult: his autobiography to 1743 (in German), edited by W. Germann (Altoona, 1881), and his *Life* by M. L. Stoever (Philadephia, 1856), W. J. Mann (ib., 1887), and W. K. Frick (ib., 1902); also Ochsenford, *Muhlenberg College, a Quarter-Centennial Memorial Volume* (Allentown, 1892).

MUHLENBERG, JOHN PETER GABRIEL (1746–1807). A Lutheran preacher and leader in the Revolutionary War, son of Heinrich Melchior Muhlenberg (q.v.). He was born at Trappe, Pa., Oct. 1, 1746, was sent to the University of Halle to be educated, but entered the army, and passed a year as a private in the dragoons. Returning to America, 1766, he studied for the Lutheran ministry; was called to Virginia, 1771; to have a legal standing as a clergyman there, went to England, 1772, and was ordained by the Bishop of London; in the same year he was settled at Woodstock, Va. Soon after the beginning of the Revolutionary War he told his congregation that there was a time to preach and a time to fight, and at the close of the services he threw off his gown, showing himself in full uniform, and read from the pulpit his commission as colonel. He had the drummers strike up for volunteers, and nearly 300 of his congregation volunteered and joined his regiment, the Eighth Virginia, popularly known as the German regiment, afterward noted for its courage and good discipline. In 1774 he was a member of the House of Burgesses and served on the committee of safety, and two years later he sat in the State convention. He participated in the fighting at Charleston in 1776, and was made brigadier general the following year and placed in command of the Virginia line. He took part in the battles of the Brandywine, Germantown, and Monmouth, and in the capture of Stony Point. He defended Virginia against the expeditions of Leslie and Arnold, and was commander in chief there till the arrival of Steuben. Upon the invasion of Virginia by Cornwallis he was next in command to Lafayette, and at the siege of Yorktown he was in command of the first brigade of light infantry. He retired at the close of the war with the rank of major general. Soon after he settled in Pennsylvania. He served in Congress in 1789–91, 1793–95, and 1799–1801. In the latter year he was chosen United States Senator, but resigned when Congress met to become supervisor of revenue for the district of Pennsylvania, and in 1803 he was appointed collector of the port of Philadelphia, in which position he died near Philadelphia, Oct. 1, 1807. Consult his *Life* by his great-nephew, Henry A. Muhlenberg (Philadelphia, 1849).

MUHLENBERG, WILLIAM AUGUSTUS (1796–1877). An American Episcopal clergyman and philanthropist, grandson of Heinrich Melchior Muhlenberg. He was born in Philadelphia and graduated at the University of Pennsylvania in 1814. Three years later he was ordained deacon and served as assistant to Bishop White at Christ Church, Philadelphia. Ordained

priest in 1820, he was rector from 1821 to 1828 of St. James's Church, Lancaster, Pa., where he helped to establish the first public school in the State outside of Philadelphia. He founded in 1828 at Flushing, Long Island, a school afterward known as St. Paul's, of which he was principal until 1846. Then he was rector of the church of the Holy Communion in New York until 1858, in the latter year becoming superintendent and pastor of St. Luke's Hospital, which he had founded. In the later years of his life he was instrumental in establishing an industrial Christian settlement at St. Johnland, Long Island. He died in St. Luke's Hospital, April 8, 1877. To trace his effect upon his time would be to record the origin of several of the most important movements within the Episcopal church. Thus, he made his New York parish the first free-seat church of his communion in America; he organized the first sisterhood within the same limits in 1845, known as the Sisterhood of the Holy Communion; and the important later developments in the direction of Christian unity (see EPISCOPAL CHURCH) and of liturgical enrichment and flexibility both really grew out of his memorial to the House of Bishops in 1853. Church music and hymnody also owe much to him; he published three books in this department; but his most important literary work is contained in *Evangelical Catholic Papers* (1875–77). For his life, consult biographies by Anne Ayres (4th ed., New York, 1889) and William Newton (Boston, 1890); also Leighton Coleman, *The Church in America* (New York, 1896).

MUHLENBERG COLLEGE. An institution for higher education founded at Allentown, Pa., in 1867. It is under the control of the Evangelical Lutheran church. The college includes preparatory and collegiate departments, with classical, scientific, and philosophy courses leading to the degrees of A.B., S.B., and Ph.D. The total enrollment in all departments in 1914–15 was 213 and the faculty numbered 14. In the library are 21,000 volumes. The campus of 72 acres and the college building are valued at $755,500. The income from all sources in 1913–14 was $26,205. The college had an endowment of about $300,000. The president in 1915 was John A. W. Haas, D.D.

MÜHLFELD, mül'fĕlt, RICHARD (1856–1907). A German clarinetist and symphony director, born at Salzungen. He received musical instruction under Emil Bückner at Meiningen. At 17 an expert clarinetist, from 1875 to 1896 he was a member of the orchestra at the Bayreuth Festival. In 1905 he became chief symphony director at the ducal court chapel of Brunswick.

MÜHLHAUSEN, mül-hou'zen. A town in the Province of Saxony, Prussia, on the Unstrut, 30 miles northwest of Erfurt (Map: Prussia, D 3). It is an old town with a number of churches, of which that of St. Blasius dates from the twelfth century and the church of St. Mary from the fourteenth century, and a mediæval Rathaus. It is surrounded with modern suburbs and has a Gymnasium, a trade and textile school, a seminary for teachers, and a theatre. There are manufactures of woolen and linen goods, carpets, leather, cigars, chewing tobacco, sewing machines, bicycles, furniture, dyes, malt and beer. The city has considerable trade in cattle, grain, and fruit. Pop., 1900, 33,433; 1910, 35,091. Mühlhausen appears in history as early as 925, when it was a fortified post. It rose to considerable importance as a free city in the fourteenth century, and at the time of the Peasants' War was the headquarters of the Anabaptist leader, Thomas Münzer, who was executed in the neighborhood in 1525. The town was finally incorporated as a part of the Kingdom of Prussia in 1815.

MÜHLHEIM, mül'hĭm. See MÜLHEIM.

MUIR, mūr, JOHN (1810–82). An English Sanskrit scholar. He was born in Glasgow and was educated at the University of Glasgow and the East India School at Haileybury. He engaged in the civil service in British India in 1829–53 and devoted himself to the study of the languages, history, and antiquities of India. In 1853 he retired from the service and settled at Edinburgh, devoting himself to the advancement of Oriental literature, especially in its bearing upon Christianity. In 1846 he offered to the University of Cambridge a prize of £500 for the best treatise on the errors of the Hindu systems of philosophy and on expounding the principles of Christianity to learned natives of India; and he gave, in 1862, £5000 to the University of Edinburgh for the endowment of a professorship of Sanskrit and comparative philology. Muir did much to help the spread of Christianity among the Hindus. His most important work was *Original Sanskrit Texts on the Origin and History of the People of India, their Religion and Institutions* (London, 1858–72; 3d ed., 5 vols., 1872–74), treating of the origin of caste, racial and linguistic affinities of the Hindus, and the Vedas, including Vedic mythology. In 1875 he issued an anthology of Sanskrit proverbs entitled *Religious and Moral Sentiments Metrically Rendered from Sanskrit Writers*, followed by a similar volume called *Metrical Translations from Sanskrit Writers* (London, 1879).

MUIR, JOHN (1838–1914). An American explorer and naturalist, born at Dunbar, Scotland, April 21, 1838. He studied at the Dunbar Grammar School and then, having come to the United States, at the University of Wisconsin. After four years he began to explore the less-known portions of the North American continent, devoting his attention particularly to the western coast and to Alaska, where the Muir Glacier (q.v.) is named for its discoverer. In 1878 he visited the Arctic Regions on the U.S.S. *Corwin* in search of the De Long expedition; in 1899 became a member of the Harriman expedition to Alaska; and subsequently traveled in Russia, Siberia, Manchuria, India, Australia, and New Zealand (1903–04), in South America (1911), and in Africa (1912). John Muir preceded the "conservation movement" many years in his earnest advocacy of the preservation of American forests and the establishment of national parks and reservations, especially in the Sierras, with which his name will always be identified. He became a member of the American Academy of Arts and Letters and received honorary degrees from the universities of Wisconsin and California and from Yale. Muir died at Los Angeles, Dec. 24, 1914. He published: *The Mountains of California* (1894; enlarged ed., 1911); *Our National Parks* (1901; enlarged ed., 1909); *Stickeen* (1909); *My First Summer in the Sierra* (1911); *The Yosemite* (1912); *Story of my Boyhood and Youth* (1913); and nearly 150 magazine and newspaper articles on natural history. He also

edited *Picturesque California*. After his death appeared (1915) *Letters to a Friend* and *Unpublished Prose and Letters*, containing a practically complete work on Alaska.

MUIR, Matthew Moncrieff Pattison (1848–). An English chemist. He was born and educated in Glasgow, studied at the University of Tübingen, and became fellow and prelector in chemistry at Gonville and Caius College, Cambridge. Muir did much to popularize modern chemistry. He published: *Qualitative Analysis and Laboratory Practice* (1874), with T. E. Thorpe; *Chemistry for Medical Students* (1878); *Chemistry* (1883); *A Treatise on the Principles of Chemistry* (1884; 2d ed., 1889); *Elements of Thermal Chemistry* (1885); *Practical Chemistry* (1887), with D. J. Carnegie; *Chemistry of Fire* (1893); *The Alchemical Essence and the Chemical Element* (1894); *The Story of the Wanderings of Atoms* (1898); *The Story of Alchemy* (1902); *The Elements of Chemistry* (1904); *A History of Chemical Theories and Laws* (1906); *The Chemical Elements* (1908).

MUIR, Thomas (1845–). A British mathematician and educator. He was born near Lanark and was educated at Wishaw Public School, at Glasgow University, and in Germany. For a time he taught in Glasgow, first as assistant professor of mathematics in the University, and then as head of the mathematical and science departments of the high school. He then removed to Cape Town, South Africa, where he was vice chancellor of the University of the Cape of Good Hope (until 1901) and Superintendent General of Education in Cape Colony. His principal publications are a *Treatise on the Theory of Determinants* (1882), *History of Determinants* (1890), and *Theory of Determinants in the Historical Order of Development* (2 vols., 1906–11).

MUIR, Sir William (1819–1905). A British administrator and Orientalist. He was born at Glasgow, studied at the universities of Glasgow and Edinburgh, and in 1837 entered the Bengal civil service of the East India Company. Ten years later he was appointed secretary to the Lieutenant Governor of the Northwest Provinces, and during the Indian Mutiny (1857) he was chief of the intelligence department at Agra and successfully took charge of communications upon which largely depended the suppression of the mutiny. When the capital was removed to Allahabad, in 1858, he went there as the Lieutenant Governor's secretary and had the chief share in organizing the government. Unfortunately his plans for raising the largest amount of revenue compatible with the ability and contentment of the natives were not adopted in London, although approved by expert opinion in India. He was provisional member of the Viceroy's legislative council (1864–67), foreign secretary in the Viceroy's executive council (1867), Lieutenant Governor of the Northwest Provinces (1868–74), and financial member of the Viceroy's executive council (1874–76). The heavy land assessments were reduced by him, and the custom of female infanticide among Hindus was tactfully suppressed. His interest in education was shown in the founding of Muir College and Allahabad University. So far as official duties permitted Muir was a diligent student of Oriental literature and thought. He was a profound Arabic scholar and investigated the life of Mohammed and the history of Islam. His publications include: *Life of Mahomet* (4 vols., 1858–61), an authoritative work; *The Corân* (1878); *Ancient Arabic Poetry* (1879); *The Caliphate* (2d ed., 1893); *Agra in the Mutiny* (1896); *The Mohammedan Controversy* (1897).

MUIR GLACIER. One of the largest and best known of the Alaskan glaciers, named after John Muir (q.v.), who discovered it in 1878. The ice stream flows down the slopes of Mount Fairweather, which is over 15,000 feet high, and enters Glacier Bay as a palisade of ice nearly 2 miles long and from 136 to 210 feet high. It forms a barrier across the head of the bay, and its submarine base reaches as much as 760 feet below the sea level. In the lower course the ice moves about 7 feet a day, breaking off at the end in great bergs that float away to the sea.

MUIRHEAD, mūr'hĕd, John Henry (1855–). A British philosopher, born in Glasgow. His mother was a kinswoman of James Frederick Ferrier (q.v.). He studied at Glasgow Academy and University and at Balliol College, Oxford. For a time he was assistant to the professor of Latin at Glasgow; then lectured on philosophy at Bedford College, London; and in 1900 became professor of philosophy in the University of Birmingham. Muirhead was a Hegelian. He was an editor of the *Hibbert Journal* and of a series called "The Library of Philosophy." He translated into English Zeller's *Aristotle and the Earlier Peripatetics* (1897), contributed to *Mind*, and wrote *The Elements of Ethics* (1892; 3d ed., 1910); *Philosophy and Life* (1902); *The Service of the State* (1908), four essays on T. H. Green's political teaching; *The Starting Point of Poor Law Reform* (1910); *German Philosophy in Relation to the War* (1915).

MUIR-MACKENZIE, *ma*-kĕn'zĭ, Montague (1847–1919). An English barrister and law writer. He was educated at Charterhouse School and at Brasenose College, Oxford, and was a fellow of Hertford College, Oxford (1874–88). In 1873 he was called to the bar, and he was secretary to Lord Chief Justice Coleridge for the four following years. He became recorder of Deal in 1892 and was a bencher of the Middle Temple from 1894 to 1905 when he became an official referee. His publications are upon technical subjects, such as *Bills of Lading, Judicature Acts, Laws of Registration*, and *Bankruptcy Acts*.

MUIR WOODS. See National Monuments.

MUKADDASI, mōō'kăd-dā'sē (Ar. *Abū 'Abd Allāh Muḥammad ibn Aḥmad al Muḳaddasī*, or *al Maḳdisī*). A famous Mohammedan geographer. He was born at Jerusalem (whence his name: *Muḳaddasi*=from Jerusalem) in 946. His father was an architect and gave his son a good education. In his twentieth year he made the pilgrimage to Mecca and afterward decided to devote his life to the study of geography. For a score of years he journeyed up and down through the Moslem world, seeking information with infinite labor and excellent judgment. The only Mohammedan countries not visited by him seem to have been India, Sejestan, and Spain. In 985 he published his book, dividing it into three parts: (1) what he had himself seen; (2) what he had learned from trustworthy witnesses; (3) what he had read. He then resumed his travels and three years later issued a new and enlarged edition. Mukaddasi's

travels did not reach quite so far as those of some other Arabic geographers, but, judged by the zeal with which he collected his material, the good sense he showed in sifting it, and the clear and logical arrangement of his work, he is easily the foremost of them all. It has been edited by De Goeje in his *Bibliotheca Geographorum Arabicorum*, vol. iii (*Descriptio Imperii Moslemici Auctore Al-Mokaddasi*, Leyden, 1877); the part relating to Syria, including Palestine, has been translated into English with notes by Le Strange in the *Library of the Palestine Pilgrims' Text Society*, vol. iii (London, 1886). Mukaddasi was a trained philologist, but his imitation in the description of each region of the dialect of its inhabitants, though not without its value to us, is more to the credit of his versatility than of his good taste. He was liberal in his religious views and a member of the famous philosophical society of Basra called the *Ikhwan al Safa* (the pure brothers). Consult: August Sprenger, *Die Post- und Reise-Routen des Orients* (Leipzig, 1864); Alfred von Kremer, *Kulturgeschichte des Orients*, vol. ii (Vienna, 1877); G. Le Strange, *Palestine under the Moslems* (London, 1890); Carl Brockelmann, *Geschichte der arabischen Literatur*, i (Weimar, 1898); R. A. Nicholson, *A Literary History of the Arabs* (London, 1907); C. I. Huart, *Histoire des Arabes* (Paris, 1912).

MUKDEN, mo͞ok-dĕn′, or **MOUKDEN.** The capital of Manchuria and of the Province of Shengking, situated in a fertile region near the Hun-ho, 110 miles northeast of Newchwang, its port (Map: China, M 3). It is surrounded by a brick wall and is divided into nine parts, of which the central contains the old Imperial palace, the former examination hall, and beautiful administration buildings in the foreign style of architecture. The city is regularly and solidly built, but is of little architectural interest. It is the seat of a considerable industry, and is the converging point for the principal trade routes between northern and southern Manchuria and China. Mukden trades chiefly in agricultural products and fur, and is the seat of the administration of Manchuria. In the vicinity of the city are the tombs of the ancestors of the late Manchu dynasty of China. The population is estimated at about 158,000. The city suffered greatly during the Boxer uprising of 1900, and about it was fought, February-March, 1905, the culminating battle of the Russo-Japanese War (q.v.). Mukden is a clean, well-ordered city. Theoretically it is open to foreign trade. It has rail connection with Sinminting and Antung. Consult Dugald Christie, *Thirty Years in the Manchu Capital* (New York, 1914).

MUKHTAR PASHA, mo͞ok′tär pä-shä′, (Ahmed Mukhtar Pasha el Ghazi) (1832–). A Turkish general and administrator, born at Brusa in Asia Minor. He was educated at the Constantinople military school, was rapidly promoted, and became successively professor and governor of the school. He served as adjutant in the Crimean War, as a staff officer in the Montenegrin campaign of 1862, and in 1870–71 in campaigns against the Arabs of Yemen, in which he gained the titles of pasha and marshal. He was made commander of the Second Army Corps (1873), and in 1875, at the breaking out of the troubles in Bosnia and Herzegovina, assumed command of the Turkish forces there. After his defeat at the Duja Pass in the Montenegrin campaign of 1876 Mukhtar was sent to Erzerum to take charge of the operations against Russia on the outbreak of war with that country in 1877. On April 29 he was defeated and driven into Kars; but, in a number of severely contested battles during the following months, his troops displayed great courage and regained the position, defeating the Russians severely near Erzerum on June 25 and compelling them in July to raise the siege of Kars. For his exploits in this campaign the title of Ghazi (victorious) was bestowed upon him. On October 14–15, at Aladja Dagh, the Russians gained an important victory over Mukhtar, driving him back to Kars and soon afterward to Erzerum. In November Kars was stormed by the Russians, and before the end of the year Mukhtar was recalled. He put down the Cretan insurrection in 1878 and was put in command on the Greek frontier in 1879. In 1885 he was appointed Turkish High Commissioner in Egypt. In 1912 he was one of the negotiators appointed to conclude a peace with Italy and to pacify Albania. The latter mission was interrupted by the outbreak of the Balkan War. He was appointed Grand Vizier in July, 1912, but resigned in the following October. For his son, see below.

MUKHTAR PASHA, Mahmud (1867–). A Turkish soldier and diplomat, son of the Grand Vizier Ghazi Mukhtar. He was born in Constantinople and returned thither in 1893 after seven years' military education in Germany. He took part in the Græco-Turkish War of 1897, in spite of the prohibition of the Sultan. In 1900 he was appointed to a minor office in the War Department and in 1908 was put in command of the First Army Corps. In 1909 he was forced to flee to Greece, but soon returned to Constantinople and received the command of the First Corps. In 1910 he was Minister of Marine in Hakki Pasha's cabinet and brought about the building of the first Turkish dreadnought. At the outbreak of the Balkan War in 1912 he was again Minister of Marine, but he went to the front, commanded the Third Army Corps at Kirk-Kilisseh, and was severely wounded. In April, 1913, he became Ambassador at Berlin. He wrote an account of his experiences in the Balkan War, of which a German and a French version appeared in 1913.

MULA, mo͞o′lä. A town of southeast Spain, in the Province of Murcia, situated on a branch of the Segura, 18 miles west by north of the city of Murcia (Map: Spain, E 3). The place is unimportant, but has some reputation on account of the warm sulphurous baths known as Baños de Mula, some 3 miles east. Pop., 1900, 12,733; 1910, 11,922.

MULAT'TO. See Mixed Races.

MUL'BERRY (OHG. *mōrberi, mūrberi*, Ger. *Maulbeere*, mulberry, from Lat. *morum*, Gk. *μῶρον, mōron, μόρον, moron*, mulberry + *berry*, AS. *beri, berige*, OHG. *beri*, Ger. *Beere*, Goth. *basi*, berry), *Morus.* A genus of trees of the family Moraceæ, natives of temperate and warm climates, with deciduous leaves, unisexual flowers in short, thick spikes, the perianth of the female flowers becoming succulent and closing over the small pericarp to form with other flowers of the spike an aggregate fruit. There have been about 100 species described, but most authors have reduced them to 10 or even less. The

common mulberry, or black mulberry (*Morus nigra*), a long-lived native of the middle parts of Asia introduced into cultivation in Europe more than a thousand years ago, and now naturalized there, is a low, much-branched tree, with thick, rough bark and broad, unequally serrated, and very rough heart-shaped leaves. It is not hardy in the United States as far north as New York, and is seldom seen except in the South and in California, where some of the improved varieties are grown. The fruit, which is purplish black, with dark-red juice, fine aromatic flavor, and subacid sweet taste, is often produced in prodigious quantities and is esteemed for dessert, for preserving, and for wine making. The wood is employed in cabinet-work, but is not of much value. The leaves are sometimes used for feeding silkworms. It is propagated by seed, suckers, layers, or cuttings, and succeeds best in a rich light soil. The white mulberry (*Morus alba*) has been planted in southern Europe since 1540, in India and China, where it is native, from time im-

RED MULBERRY (*Morus rubra*).

memorial for its leaves, which are the best food for silkworms. In North America it has been extensively planted and in places exists in a half-wild state as trees a foot or more in diameter. (See KENRICK, WILLIAM.) The fruit is almost white, and much less palatable than that of the black mulberry, although there is great difference among the varieties. The best variety for feeding silkworms, on account of its rapid growth and abundant leaves, is that called the Philippine mulberry. A variety called the Russian mulberry is a hardy, rapid grower, well adapted to hedges, windbreaks, small timber, and ornamental plantings, for which purpose it has been extensively planted in the western United States. *Morus multicaulis*, by some considered a variety of *Morus alba*, once grown extensively in the United States to feed silkworms, is seldom seen now. In India the white mulberry is treated as a bush, and cut down twice a year, the stripped shoots being thrown away. Its bark has long been used in China and Japan for making paper. It grows readily from cuttings. The root has a considerable reputation as a vermifuge. The red mulberry (*Morus rubra*), a native of eastern North America, ranging from New England to the Dakotas and south to southern Florida, is the largest tree of the genus, sometimes attaining in the South a height of 70 feet and 3 feet in diameter. It endures severe frosts much better than the preceding, and is therefore preferred for cultivation in some parts of Europe. Its fruit is deep red and almost as pleasant as the black mulberry. The wood is much more valuable, being fine-grained, strong, durable, and adapted even for shipbuilding. Of each of these three species there are numerous named varieties which are cultivated for their fruits, but they have not received the attention in the United States that they deserve. The Indian mulberry (*Morus indica*) has black fruit of a delicate flavor, and the leaves are extensively used for feeding silkworms in China, Cochin China, and Bengal. *Morus alba; Morus celtidifolia* and *Morus corylifolia*, Peruvian species; *Morus lævigata*, the species most common in the north of India; and *Morus cashmeriana*, probably a form of *Morus indica*, a native of Cashmere, produce pleasant fruit. *Morus dulcis*, a native of the north of India, is said to be superior in flavor to all others.

The paper mulberry (*Broussonetia papyrifera* and *Broussonetia kæmpferi*), a native of India, Japan, and islands in the Pacific, frequently planted for ornament and shade in America and Europe, differs from the true mulberry in having the female flowers collected in a globular mass. The fruit is oblong, dark scarlet in color, sweetish, but insipid. The tree is of moderate size, or, in cultivation, a bush 6 to 12 feet high with leaves either simple or lobed. The islanders of the Pacific cultivate this species with great care and make a kind of clothing from the bark. For this purpose branches an inch or more in diameter are macerated in water. The epidermis is then removed by scraping, and the inner bark beaten thin into kapa cloth. The young shoots are also used for paper making in Japan and the East. When the shoots are cut new ones spring up very rapidly. Silkworms eat the leaves. See Plate of MULBERRY AND LIQUIDAMBER, accompanying latter title.

MULBERRY FAMILY. See MORACEÆ.

MUL'CASTER, RICHARD (?1530–1611). An English schoolmaster, whose birthplace may have been the old border tower of Brackenhill Castle on the river Line, or perhaps Carlisle. From Eton he passed to King's College, Cambridge, and thence to Christ Church, Oxford, where he graduated M.A. in 1556. When the Merchant Taylors' School was founded in London (1561), Mulcaster was appointed its first head master, a post which he held till 1586. Here he probably had the poet Spenser as a pupil. Ten years later he was elected high master of St. Paul's School. This office he retained to the great age of 78. He was also vicar of Cranbrook (1590), prebend of Salisbury (1594), and rector of Stanford Rivers (1598). He died April 15, 1611. In his own time Mulcaster gained wide repute as an efficient teacher, and in recent times much attention has been given to two books: *Positions, wherein those primitive circumstances be examined, which are necessarie for the training up of children, either for skill in their book or*

health in their bodie (1581), and the *Elementarie, which entreateth chefelie of the right writing of our English tung* (1582). Mulcaster strenuously advocated physical training as a part of the education of boys, and implied that there should be grammar schools for girls. He taught his boys music and singing, and permitted them to perform in masques and interludes before the Queen. Consult the reprint of the *Positions*, edited by Quick (London, 1888).

MULCH (more correctly *mulsh*, probably from AS. *molde*, earth mold; ultimately connected with Goth. *malan*, Ir. *melim*, Lith. *malti*, Lat. *molere*, to grind, Eng. *meal*). A covering of loose material, such as brush, leaves, manure, or straw, maintained on the surface of the soil mainly for the purpose of preventing evaporation, which it accomplishes by breaking the continuity of the capillarity in the soil and thus retarding the rise of water to the surface. Stirring the surface soil, and thus maintaining what is termed a soil mulch, brings about the same result. The use of the mulch of vegetable matter is probably not so common as formerly, but the soil mulch is increasing in favor and in arid regions where agriculture is dependent upon irrigation and conservation of moisture is a matter of great importance. In addition to checking evaporation, mulches of vegetable matter are useful in protecting the surface soil from puddling and washing, keeping the soil cool, preventing freezing, and retarding growth in the spring. Mulching is a valuable means of reclaiming washed or galled lands and for securing a growth on dry, bare spots in lawns and meadows. A mulch of barnyard manure not only conserves moisture, but furnishes plant food.

Mulching berry bushes, orchard trees, etc., on a large scale with coarse manure and refuse material is not generally to be recommended, because it interferes with cultivation, harbors insects, and causes the plant roots to remain near the surface, thus increasing the danger of injury by drought. Mulches are, however, found useful in orchards on hilly land very subject to washing, and on a small scale for special purposes, such as protecting small fruits from injury by late frosts by retarding growth in spring. The soil mulch is more generally useful. The depth and character of this soil mulch must be determined by a variety of conditions, among which are the kind and root habits of the plant and the character of the soil and climate. It is evident that any crop, such as corn, with an extensive surface root system, would be injured by the destruction of its roots if stirring were frequent and deep. Again, in arid regions the mulch must be deeper and more perfect than in regions of frequent rainfall, in order to be effective and useful.

MULDER, mōōl'dēr, GERARDUS JOHANNES (1802–80). A Dutch chemist, born at Utrecht. After obtaining the degree of doctor of medicine at the university of his native town in 1825, he commenced the practice of his profession at Amsterdam, but was soon invited to teach botany and subsequently chemistry at the medical school at Rotterdam. In 1840 he was elected professor of chemistry at the University of Utrecht, and kept this post until 1868, when he retired from active service. Mulder is best known for his researches on the proteids and for his excellent works on physiological and agricultural chemistry. His *Chemistry of Vegetable and Animal Physiology* has been translated into English by Fromberg, and his *Chemistry of Wine* by Bence Jones. He also wrote an autobiography under the title *Levensschets* (published posthumously in 1881; 2d ed., 1883).

MULDER, LODEWIJK (1822–1907). A Dutch writer, born in The Hague. He was an instructor in the Royal Military Academy at Breda in 1851–59; was then for a time employed in the Ministry of War as an editor of original documents in early Dutch history; and from 1868 to 1872 was an inspector of schools in Utrecht Province. He prepared manuals of the history of the Netherlands (1859; 12th ed., 1881) and of general history (1862; 8th ed., 1880), and wrote several plays and works of fiction, the last including his best-known work, the historical novel *Jan Faessen* (2 vols., 1856), a tale of the conspiracy against Prince Maurice of Orange, and the comedy *Een gevaarlijke vriendendienst* (1890).

MULDOR, CARL DE. See MILLER, CHARLES HENRY.

MULE (OF., Fr. *mule*, from Lat. *mulus*, mule). A hybrid animal, the offspring of the male ass and the mare, highly valued as a beast of burden. The ears are long; the head, crop, and tail resemble those of the ass rather than those of the horse; but in bulk and stature the mule approaches more nearly to the horse. The mule seems to excel both the ass and the horse in intelligence; its powers of muscular endurance are remarkable; and its sure-footedness particularly adapts it to mountainous countries. It is easily kept, endures hunger and thirst better than the horse, lives to a greater age, and is comparatively free from disease. Great care is bestowed on the breeding of mules in Kentucky, Missouri, and some other central States, in Mexico, and in Spain and Italy; and mules of particular districts are highly esteemed. An extensive experiment in mule breeding at the Mississippi Experiment Station has given instructive results. In America mules are of greatest importance, especially in the Southern States, the census of 1910 giving the number in the country at nearly four and a half million. Texas had over 706,000, while Alabama, Arkansas, Georgia, Kansas, Kentucky, Mississippi, Missouri, Oklahoma, and Tennessee each had over 200,000. The cotton and sugar-cane plantations utilize large numbers because they are easily and cheaply kept. As in other hybrid animals generally, males are more numerous among mules than females in the proportion, it is said, of two or three to one. There is no instance on record of offspring produced by two mules; but rare instances are reported of the female mule producing offspring with the horse and with the ass. The mule is very superior in size, strength, and beauty to the hinny, the offspring of the male horse and the female ass. Several breeds of jacks have been used for producing mules. The chief breeds are Andalusian, Maltese, Catalonian, Italian, and Majorcan. The Catalonian is the best of imported breeds, but in the United States the native jack, a mixture of all breeds, is most used. Black is the preferred color, and the jack should be of good size. The mare should also be well bred and of good form and color. In the Southern States mules are divided into two classes, the smaller ones cotton mules and the larger sugar mules.

MULE, IN SPINNING. See SPINNING.

MULE DEER (so called on account of the large ears), or BLACKTAIL. One of the principal species of North American deer (*Odocoileus hemionus*), originally ranging throughout the open regions of the western half of the United States, but by the end of the nineteenth century restricted to the upper valleys of the Missouri and Saskatchewan rivers and to the Rocky Mountain region and the country west and south of it from northern Mexico to southern British Columbia. Four western and southwestern forms are considered to be distinct subspecies. This deer appears never to have ranged east of the plains, and was always most numerous in the broken country of the West and Northwest. Its favorite haunts are the brushy high-lying valleys. Its favorite place in summer is the summits of the mesas and the pastures on the chaparral-covered hills or near the timber line, where it goes to rest along the edge of precipices that give a wide outlook. In winter it comes lower down, and gathers into large herds in the foothills, after the manner of the wapiti (q.v.).

It is somewhat larger than the Eastern or Virginian deer (see DEER), and stands about 3 feet, 4 inches high at the shoulder. Its body is rather heavy, and its coat is dull yellowish in summer, rather than reddish, and in winter bluish gray. The ears are very large (suggesting the name) and heavily furred; and its antlers have a short basal snag, above which the beam projects outward and then upward, forking equally and the prongs again dividing, so that there are normally 10 points. The stern bears a yellowish-white disk, and the tail is of moderate length, round, and black at the end. The hide of this species made the best buckskin known to the Indians, and was most used by them for clothing. Its value was soon learned by the pioneers in the West; and from about 1860 to 1870 this deer was pursued so ruthlessly by hide hunters that for several years about 250,000 skins were sent annually to England alone. The venison also is of superior quality, and the haunts and habits of the animal, his craft and speed, make him the most interesting to the sportsmen of all the American deer. The fawns are often domesticated, and the adults thrive well in parks, and are to be seen in every zoölogical garden in the world. Consult: J. D. Caton, *Antelope and Deer of America* (New York, 1877); A. M. Mayer (ed.), *Sport with Gun and Rod* (ib., 1892); Richard Lydekker, *Deer of All Lands* (London, 1898); T. S. Van Dyke, in Theodore Roosevelt, *The Deer Family* (New York, 1902); especially E. T. Seton, *Life-Histories of Northern Animals* (ib., 1909); and the writings of travelers and sportsmen in the western United States. See Plate of DEER OF NORTH AMERICA.

MULE KILLER. A local name in the Southern States for several species of insects and land arthropods, such as the mantis, pirate bug, and whip-tailed scorpion (qq.v.).

MULEY-HASSAN, mōō'lā-häs'sän, SIDI (1831–94). A sultan of Morocco. He succeeded his father, Sidi Muley-Mohammed, in 1873. He was energetic and warlike and spent the greater part of his reign in the field, enforcing his authority over the unruly Berber tribes or extending the boundaries of the Empire in the direction of the Sahara. In 1880 reports of shocking cruelties committed on the Jews in his dominion led to the calling of an international conference at Madrid, which drew up a protocol decreeing liberty of conscience in Morocco, a decision to which the Sultan acceded, but which he altogether ignored.

MULFORD, ELISHA (1833–85). An American Protestant Episcopal clergyman and philosophical writer, born in Montrose, Pa. He graduated at Yale in 1855 and studied for the ministry in the Union Theological Seminary, at Andover, and later at Halle and Heidelberg in Germany. He was ordained a priest in 1862. A part of his career was spent in ministerial work in various charges, but from 1864 to 1877 he lived in his native town without parochial charge and engaged in study. Among his publications are *The Nation, the Foundation of Civil Order and Political Life in the United States* (1870) and *The Republic of God: An Institute of Theology* (1881). In 1881 he settled in Cambridge, Mass., and lectured in the Episcopal Theological School there until his death.

MUL'GRAVE, CONSTANTINE JOHN PHIPPS, second BARON (1744–92). A British naval officer and politician. Entering the navy at 16, he served in the reduction of Martinique and of Havana and in 1765 was made post captain. In 1768 he entered the House of Commons for Lincoln, and became known as one of the King's Friends, a political party which supported George III in the attempt to enforce the principles of arbitrary government, especially in relation to the American Colonies. Five years later he was commanding the *Racehorse*, which with the *Carcass* (on which the naval hero Nelson was a midshipman) attempted to find a northern route to India, but was stopped by ice at Spitzbergen. After his return he again sat in the House of Commons (1777–84), and saw active service in naval operations against the French off Ushant (1778) and off Brest (1781). In 1784 Mulgrave was appointed a commissioner for India. Second Baron by succession in 1775, he was made a peer of Great Britain as Baron Mulgrave in 1790. He had the chief part in founding the Society for the Improvement of Naval Architecture. *A Voyage towards the North Pole* (1774) is the account of his Arctic experiences

MULGRAVE, LORD. See BUCKINGHAM AND NORMANBY.

MULHACÉN, MARQUIS OF. See IBÁÑEZ DE IBÁÑEZ DE IBERO, CARLOS.

MUL'HALL, MICHAEL GEORGE (1836–1900). A distinguished statistician, born in Dublin, Ireland, Sept. 29, 1836. He was educated at the Irish College in Rome. In 1858 he emigrated to Buenos Aires, where, three years later, he established the *Standard*, said to be the first daily newspaper printed in English in South America. This daring and successful enterprise Mulhall kept going till 1894. Returning to England in 1878, he gave his attention to statistics. In 1884 he was elected to the British Association for the Advancement of Science. Besides numerous contributions to the *Contemporary Review*, his works include: a *Handbook of the River Plata* (1869), the first English book published in Argentina; *Rio Grande do Sul and its German Colonies* (1873); *The English in South America* (1878). In 1880 Mulhall, who had for some time been gathering materials on his favorite subjects of statistics, brought out his *Progress of the World in Arts, Agriculture, Commerce, Manufacture, Instruction, Railways, and Public Wealth*, covering the period from 1800 to the time of its publication. This

was followed by other highly valued works on statistics: *History of Prices* (1885); *Industries and Wealth of Nations* (1896); and a *Dictionary of Statistics* (1883; 4th ed., 1899). Mulhall died Dec. 13, 1900, in Dublin.—His wife, MRS. MARION MULHALL, is the author of *Between the Amazon and the Andes* (1883) and several essays, including the *Celtic Sources of Dante's Divine Comedy*. For this last monograph she was honored by a chair in the Arcadia of Rome.

MÜLHAUSEN, mul-hou'zen (Fr. *Mulhouse*). The second largest city of Alsace-Lorraine, Germany, situated on the Ill and the Rhine-Rhone Canal, 58 miles south-southwest of Strassburg (Map: Germany, B 5). It is divided into the irregularly built old town, on an island of the Ill, the new town, started in 1826, between the old town and the canal, and the workingmen's colony (*cité ouvrière*) on the north. The old town, with the exception of the Rathaus and a few modern churches, dates from the sixteenth century. The border of the canal is the best part of the new town, which has a fine post office and a museum established by the Industrial Society. The society's building also contains natural-history collections, a library, schools of drawing, industrial art, and textile working. The workingmen's colony, established in 1853 by Mayor Dollfus, is provided with model dwellings and with reading rooms, schools, restaurants, baths, and other modern institutions. In the suburbs is a good zoölogical garden. The educational institutions of Mülhausen include a Gymnasium and schools of chemistry and mechanics. It is the most important industrial city of Alsace-Lorraine and one of the largest textile centres of the Empire. This industry of Mülhausen dates from 1746, and the cotton mills are situated partly in the city and partly in the vicinity and specially in the adjacent settlement of Dornach. Over 80,000 persons are said to be engaged in the textile mills and in other establishments connected with the textile industry in the manufacturing district around Mülhausen. Besides cotton and woolen goods and kindred products, there are also manufactured machinery, chemicals, iron, copper, and lead castings, dyes, oil, sewing machines, stoves, starch, cordage, cement, and lumber. It has railway shops and an extensive trade in local manufactures, wine, and the agricultural products of the vicinity. Pop., 1900, 89,012; 1910, 95,041, largely Roman Catholics. Mülhausen first appears in 717, when Adalbert, Duke of Alsace, presented it to the monastery of St. Stephen in Strassburg. It was taken by Rudolf of Hapsburg in 1261 and raised to a free city of the Empire in 1273. In order to maintain its independence it entered into an alliance with the Swiss cantons of Bern and Solothurn in 1466, and in 1515 became a member of the Swiss Confederation and was recognized as such at the Peace of Westphalia. It joined the French Republic in 1798, and passed to Germany with Alsace-Lorraine in 1871. Mülhausen was captured by the French in the early part of the European War which began in 1914. They were later compelled to evacuate it. See WAR IN EUROPE. Consult: Metzger, *La république de Mulhouse* (Lyons, 1883); Schneider, *Geschichte der Stadt Mühlhausen* (Mülhausen, 1888); Heydenreich, *Aus der Geschichte der Reichsstadt Mühlhausen* (Halle, 1900); Jordan, *Der Uebergang der freien Reichsstadt Mühlhausen an Preussen* (Mülhausen, 1902).

MÜLHEIM-ON-THE-RHINE, mul'him, or **MÜHLHEIM.** A town of the Rhine Province, Prussia, on the right bank of the Rhine, 2 miles north of Cologne (Map: Prussia, B 3). Mülheim is extraordinarily well laid out for an old town, has a good harbor, a handsome modern Gothic church, a Realgymnasium, a textile school, and a commercial school. It manufactures wire ropes and cables, velvet, silk, canvas, fire brick, machinery, vehicles, chemicals, electrical appliances, and tobacco, and trades in wine. Pop., 1900, 45,085; 1910, 53,425. Mülheim is of ancient origin, and became a town as early as 1322.

MÜLHEIM-ON-THE-RUHR, -rōōr. The capital of a circle in the Rhine Province, Prussia, on the Ruhr, 16 miles north of Düsseldorf (Map: Prussia, B 3). It has a church dating from the twelfth century, a Gymnasium, an industrial and commercial school, and a Realschule. Coal and iron are mined in the district, and there are extensive smelters, manufactures of machinery, tubes, zinc ware, leather, paper, tobacco, cordage, beer, and brandy. Mülheim does a large river business in coal. Pop., 1900, 38,292; 1910, 112,580.

MULHOLLAND, mŭl'hŏl'and, WILLIAM (1855–). An American hydraulic engineer. He was born at Belfast, Ireland, and was educated at the Christian Brothers' School, Dublin. Having come to the United States, in 1886 he became superintendent and chief engineer of the water works of Los Angeles, Cal., and in that capacity made plans and estimates and had charge of the construction of the Los Angeles Aqueduct for conveying water from the Sierra Nevada Mountains (250 miles distant) at a cost of $24,500,000. He served also as a consulting engineer on irrigation and water-power projects.

MULIER, mū-lēr', PIETER, THE YOUNGER, called TEMPESTA (1637–1701). A Dutch landscape and marine painter, born at Haarlem, son and probably pupil of the marine painter Pieter Mulier, the Elder (died at Haarlem, 1670)—not, as was for a long time erroneously supposed, son of Pieter de Molyn (q.v.). After having traveled through Flanders and Holland, he went to Rome and soon acquired a reputation by his pictures of storms at sea (whence his surname, given him by the Italians). He also painted Italian landscapes, with historical or idyllic accessories, in a facile, decorative style with strong light effects. In Genoa, whither he went from Rome, he was imprisoned for 16 years under suspicion of having caused his wife to be murdered. Characteristic works are in the galleries at Dresden, Hamburg, Brunswick, Cassel, Vienna, St. Petersburg, Milan, and elsewhere.

MULITA, mōō-lē'tä (Sp., little she-mule). A small armadillo (*Tatusia hybrida*), allied to the peba, but confined to southern South America; so called from the resemblance of its face and ears to those of a mule.

MULL. The second largest island of the Inner Hebrides, belonging to Argyllshire, Scotland. It is situated north of the Firth of Lorne and is separated from the west coast of Scotland by the Sound of Mull, from 1 to 3 miles wide (Map: Scotland, B 3). It has an area of 347 square miles, is very irregular in shape, deeply indented with bays and sea lochs, and consists mainly of volcanic rock with some outcroppings of granite. The island as a whole is mountainous, rising in Ben More to a height

of 3185 feet. The scenery along the coast is very picturesque, and there are beautiful lakes and woods in the interior where deer and fish attract sportsmen. The scenery in the interior is not striking, the mountains being rounded in outline, and large tracts consisting of moorlands. The soil is fertile, but the stormy and humid climate is unfavorable for agriculture, and the land is chiefly used for grazing—cattle, sheep, and horses being exported. Pop., in 1901, 4334; 1911, 3809. The chief town is Tobermory, on the north coast, with a population (1901) of 1019; 1911, 1079.

MULLAH. See MOLLAH.

MULLA'NY, JAMES ROBERT MADISON (1818–87). An American naval officer, born in New York City. He entered the navy as a midshipman in 1832 and in 1844 was promoted to the rank of lieutenant. During the war with Mexico he participated in the capture of Tabasco. After the outbreak of the Civil War he was commissioned commander in 1861 and captain in 1866, and during the conflict was assigned to duty with the blockading squadron. At his own request he was transferred from the *Bienville* to the *Oneida*, that he might take part in the battle of Mobile Bay, Aug. 5, 1864. His ship, one of the last in the line, received a terrific pounding from Fort Morgan, and was attacked by the Confederate ram *Tennessee*, which would probably have sunk it had not the monitor *Winnebago* come to the rescue. As it was, the *Oneida* was disabled by the fire from the fort, many of her crew were killed, and Commander Mullany lost his left arm. After the war and while commanding the North Atlantic squadron (1874–76) he gave material aid to Generals William H. Emory and Philip H. Sheridan at New Orleans, and during a revolution in Colombia protected American interests on the Isthmus of Panama. He became a commodore in 1870, a rear admiral in 1874, and retired in 1879.

MULLEIN, mŭl'ĭn (AS. *molegn*, mullein). A name given to members of the genus *Verbascum*, of the family Scrophulariaceæ, of which there are more than 100 species, mostly large biennial or perennial herbs with rather thick taproots, and natives of the Eastern Hemisphere. The more or less woolly plants produce flowers upon spikes or panicles. The leaves and flowers were formerly reputed to have medicinal qualities, but are not so recognized in the United States. They contain a sort of mucilage which is obtained by boiling the leaves in water. Three European species are well-known weeds in the United States, the common mullein (*Verbascum thapsus*), the moth mullein (*Verbascum blattaria*), and the white mullein (*Verbascum lychnitis*). *Verbascum phlomoides* is reported as established and spreading as a weed in Kentucky.

MÜLLENHOFF, mŭl'lĕn-hôf, KARL VIKTOR (1818–84). A noted Germanist. He was born at Marne, Holstein, and after studying at Kiel, Leipzig, and Berlin was professor at Kiel (1846–58) and at Berlin (1858–84). Müllenhoff's greatest works were: *Deutsche Altertumskunde*, begun in 1870 and not finished till 16 years after his death; the treatise *De Antiquissima Germanorum Poesi Chorica* (1847); *Denkmäler deutscher Poesie und Prosa aus dem 8.–12. Jahrhundert* (3d ed., by Steinmeyer, 1892), with Scherer. He also edited important texts. Consult Scherer and Schröder, *Karl Müllenhoff* (Berlin, 1896), and article in the *Allgemeine deutsche Biographie*, vol. xxii (Leipzig, 1885).

MÜLLER, mŭ'lĕr. A family of celebrated quartet players. They were the sons as well as pupils of Aegidius Christoph Müller, the principal musician to the Duke of Brunswick, and were all born in the city of Brunswick.—CARL FRIEDRICH (1797–1873) was first violin in the quartet and was also concert master to the Duke.—THEODOR HEINRICH (1799–1855) was the viola player.—AUGUST THEODOR (1802–75) played the cello, and FRANZ FERDINAND GEORG (1808–55) was the second violin. They were especially educated by their father for quartet work and were conceded to have reduced the art of string-quartet playing to a degree of perfection previously unknown. They were ambitious for greater fame than could be obtained within their own limited environment and were particularly handicapped by the Duke of Brunswick, in whose employ they were, who had formulated the order that none of his musicians should participate in any musical performance outside that connected with his own corps. In 1830 they resigned their employment and made their first appearance in Hamburg, where they met with such success that they were invited to Berlin, in which city they were received with great enthusiasm. An extended tour throughout Germany followed, and in 1837 they performed in Paris. Other successful tours made them known throughout the world. They confined their programmes almost entirely to the works of Haydn, Mozart, and Beethoven and were also a very important influence in raising

COMMON MULLEIN (*Verbascum thapsus*).

and establishing a higher standard of musical appreciation. Consult Louis Köhler, *Die Gebrüder Müller und das Streichquartett* (Leipzig, 1858).

MÜLLER, August (1848–92). A German Orientalist, born at Stettin and educated at the universities of Halle and Leipzig. In 1874 he became professor of Oriental languages at the former university. In 1882 he became professor of Oriental philology at the University of Königsberg and in 1890 professor at Halle. His numerous and valuable contributions to Oriental literature include: *Die griechischen Philosophen in der arabischen Uebersetzung* (1873); *Der Islam im Morgen- und Abendland* (1885–87); *Hebräische Schulgrammatik* (1878), the syntax of which was translated into English by James Robertson. He also reëdited (1876) Caspari's *Arabische Grammatik,* which he considerably enlarged, and with Nöldeke published a *Delectus Veterum Carminum Arabicorum* (1890), furnished with copious annotations, and thus rendered useful to those who desire to become acquainted with Arabic poetry. Especially creditable is his edition (1884) of the *History of Physicians* by Ibn Useibia, with Arabic text and a critical commentary. Several of his essays are contained in the *Zeitschrift der deutschen morgenländischen Gesellschaft* and *Beiträge zur Kunde der indogermanischen Sprachen.* In 1887 he was appointed editor of the *Orientalische Bibliographie.*

MÜLLER, mụ'lâr', Charles Louis (1815–92). A French historical painter. He was born in Paris, Dec. 22, 1815, and was a pupil of Baron Gros and Léon Cogniet. He received a first-class medal at the Paris Exposition of 1846. Müller is best known by his masterpiece, the "Roll-Call of the Last Victims of the Reign of Terror," formerly in the Luxembourg Museum. Other works are: "Lady Macbeth" (1849), Amiens Museum; "Charlotte Corday in Prison" (1875), Corcoran Gallery, Washington; "Primavera" (1846) and "Haydée" (1848), Lille Museum; he also decorated the Salle d'Etat in the Louvre. His pictures are skillfully composed, but the coloring and drawing are mediocre. He was made a member of the Institute in 1864.

MÜLLER, mụ'lĕr, Christian Friedrich (1782–1816). A German engraver, born at Stuttgart. He first studied under his father, Johann Gotthard Müller, an engraver of note, and subsequently in Paris. In 1808 his engraving of "St. John about to Write his Revelation," after Domenichino, won him a high reputation, which was maintained by his "Adam and Eve under the Tree of Life," after Raphael. In 1814 he was appointed professor of engraving in the Dresden Academy, and the rest of his life was devoted to the execution of the plate of his greatest work, the "Madonna di San Sisto," after Raphael, considered the most exact existing reproduction of the subject. His health broke down under the labor imposed by this undertaking, and he did not live to see a finished print of his work. His engravings are only 18 in number, mostly portraits, including Schiller, Jerome Bonaparte, Jacobi, and a medallion of Napoleon I.

MÜLLER, David Heinrich (1846–1913). An Austrian Orientalist, born at Buczacz in Galicia. He was educated in Vienna, Leipzig, Strassburg, Berlin, and London; from 1881 to his death he was professor at Vienna and served as an editor of the *Wiener Zeitschrift für die Kunde des Morgenlandes.* His very valuable works include: *Himjaritische Inschriften* (1875); *Südarabische Studien* (1877); *Die Burgen und Schlösser Südarabiens* (1879–81); *Sabäische Denkmäler* (1883), with Mordtmann; *Epigraphische Denkmäler aus Arabien* (1889); *Die altsemitischen Inschriften von Sendschirli* (1893); *Epigraphische Denkmäler aus Abessinien* (1894); *Ezechielstudien* (1895); *Die Propheten in ihrer ursprünglichen Form* (1896); *Südarabische Alterthümer* (1899); *Die Mehri- und Soqotri-sprache* (1902); *Die Gesetze Hammurabis und ihr Verhältnis zur mosaischen Gesetzgebung sowie zu den XII Tafeln* (1903); *Das syrisch-römische Rechtsbuch und Hammurabi* (1905); *Semitica Sprach- und rechtsvergleichende Studien* (1906); *Die Bergpredigt im Lichte der Strophentheorie* in *Biblische Studien,* No. 5 (1908); *Der Johannes, Evangelist* (1909); editions of *Kitab al Farq* (1876); of Hâmdâni, *Geography of the Arabian Peninsula* (1884–91); of part of Tabarî, *Annales* (1888).

MÜLLER, Eduard (1828–95). A German sculptor, born at Hildburghausen. His first occupation was that of a cook in the ducal kitchen at Coburg, and he practiced his trade subsequently in Munich and Paris and thence went to Antwerp, where, on the advice of the sculptor Geefs, he proceeded to study at the Academy in 1850. Two years afterward he continued his studies in Brussels and in 1857 settled permanently in Rome. Good composition, truthfulness to life, and a high degree of technical ability are the chief characteristics of his ideal figures and mythological groups, the best known of which include: "Nymph Kissing Cupid" (1862); "Faith, Love, and Hope" (1869), Schröder Mausoleum, Hamburg; "Satyr with the Mask" (1870); "The Faun's Secret" (1874); "Eve with her Children" (1880). His masterpiece is the group in heroic size, "Prometheus Bound and the Oceanids" (1874–79), National Gallery, Berlin, chiseled out of a single block of marble.

MÜLLER, Ferdinand von (1825–96). A German naturalist. He was born in Rostock, studied at Kiel, and in 1848 went to Australia, where he was engaged in botanic explorations (1848–52) and was director of the Melbourne Botanical Garden (1857–73). His researches on the subject of the acclimatization of plants yielded highly valuable results. Müller wrote: *Plants of Victoria* (1860–65); *Fragmenta Phytographiæ Australiæ* (1862–81); *Flora Australiana* (7 vols., 1863–70), with Bentham; *Select Extratropical Plants* (1891). A monument was erected in his memory in Melbourne in 1901.

MÜLLER, Frederik Paludan-. See Paludan-Müller, Frederik.

MÜLLER, Friedrich, called Maler Müller (1749–1825). A German poet, painter, and engraver, born at Kreuznach. He showed in his youth a talent for art and began to study painting at Zweibrücken, where his fascinating personality and varied endowments won him the favor of the court circles. In 1774 he went to Mannheim and soon acquired a reputation as a poet. His idyls were inspired, first by Gessner, afterward by Voss (q.v.), some of them being realistic descriptions of the life of the common

people in the Palatinate. He is best known as a dramatist, and as such a true representative of the Storm and Stress period, whose unbalanced enthusiasm is most apparent in *Golo und Genoveva*, one of the best imitations of Goethe's *Götz*. To the theme attempted in *Fausts Leben dramatisirt* his powers were hardly adequate. In 1777 he had become electoral court painter, and in 1778 means were provided to satisfy the artist's longing for Rome. Although he continued there his literary efforts for a time, he more especially cultivated painting, setting up Michelangelo as his idol, but falling into exaggerations and never attaining any real success. Gradually estranged from his art through failures and distress, he devoted himself to art-historical studies, became a sort of ambulant antiquary, and was much sought as a cicerone. Through the patronage of the Crown Prince of Bavaria (afterward King Louis I) he was enabled to pass his declining years in comparative ease. Consult: Seuffert, *Der Maler Müller* (Berlin, 1877); A. Saver, in *Deutsche Nationalliteratur*, vol. lxxxi (Stuttgart, 1883); A. Luntowski, *Maler Müller* (Leipzig, 1908).

MÜLLER, Friedrich (1834–98). An Austrian philologist and ethnologist. He was born at Jemnik, Bohemia, studied in Vienna and Göttingen, and from 1866 until his death was professor of comparative philology and Sanskrit at the University of Vienna. He was a member of the Academy of Sciences and was one of the highest authorities on comparative philology and ethnology and the relations of the two sciences. Besides contributing largely on these subjects to the *Mitteilungen der anthropologischen Gesellschaft* and the *Wiener Zeitschrift für die Kunde des Morgenlandes* and editing these periodicals for a time, he wrote the linguistic and the ethnological parts of the *Reise der österreichischen Fregatte Novara* (1867–68); *Allgemeine Ethnographie* (1873; 2d ed., 1879); *Grundriss der Sprachwissenschaft* (1876–87).

MÜLLER, Friedrich Max, known as Max Müller (1823–1900). A distinguished Orientalist and philologist. He was born at Dessau in the Duchy of Anhalt-Dessau, Dec. 6, 1823, where his father, the poet Wilhelm Müller (q.v.), was librarian of the ducal library. Max Müller received the elements of his education at Dessau and then went to Leipzig (1836), where, under Hermann Brockhaus, he began the study of Sanskrit. This he soon chose as his special pursuit, and at the age of 20 he was ready for the degree of doctor of philosophy. The first fruits of his labors appeared in a translation of the *Hitōpadēša* (1844; 2d ed., 2 vols., 1864–65). In 1844 he went to Berlin to study under Bopp and Schelling and to consult the Sanskrit manuscripts there. In Paris, whither he went in 1845, he began, at the suggestion of his teacher Burnouf, to prepare an edition of the Rig-Veda, with the commentary of Sāyana (q.v.). With this view he went to England in June, 1846, to examine the manuscripts in the East India House, London, and the Bodleian Library at Oxford, and on the recommendation of the distinguished Sanskritist H. H. Wilson, the East India Company commissioned him (1847) to edit the Rig-Veda at their expense. The first volume of this great undertaking appeared in 1849, and the sixth and concluding volume was published in 1874. A second edition was issued in 1889–92 (4 vols.). In 1848 Müller went to Oxford, where two years later he was appointed deputy Taylorian professor of modern languages; in 1854 he succeeded to the professorship, and in 1858 he was elected a fellow of All Souls' College. While pursuing his labors connected with the Rig-Veda, he published treatises on a variety of philological topics which did more to awaken in England a taste for the science of language in its modern sense than the labors of any other single scholar. Inheriting the poetic imagination and fire of his father, he had at command such a felicity of illustration that subjects dry under ordinary treatment became in his hands attractive, though it must be admitted that he advanced few new ideas of any value. In 1872 he lectured before the newly established university at Strassburg, returning to Oxford in 1876, where he gave up his professorial duties in order to assume the editorship of *The Sacred Books of the East*. The first series of this vast undertaking was issued in 24 volumes (1879–85), the second in 25 volumes (1886–95), and the third, begun in 1894, was completed by an index by Winternitz in 1910. The lectures which he delivered on the Hibbert Foundation on the *Origin and Growth of Religion* (1878) and the Gifford series on *Natural Religion, Physical Religion, Anthropological Religion,* and *Theosophy or Psychological Religion* (1890–92), as well as the *Contributions to the Science of Mythology* (2 vols., 1897), attracted much attention. He continued to publish on literary, linguistic, and philosophical subjects up to the time of his death, which occurred at Oxford, Oct. 28, 1900. Among his long list of works mention may be made of a translation into German of Kalidasa's *Mēghadūta* (1847); *The Language of the Seat of War in the East* (2d ed., 1855); *Comparative Mythology* (in the "Oxford Essays" for 1856); *History of Ancient Sanskrit Literature* (2d ed., 1860); lectures on *The Science of Language* (1861; last ed., 1891; Ger. trans., Leipzig, 2 vols., 1892–93); *The Science of Religion* (1870). *Chips from a German Workshop*, in four volumes, was published in 1867–75 (new ed., 1895; Ger. trans., 1869–76); the Hibbert lectures on the *Origin and Growth of Religion* (1878; 3d ed., 1880); *Selected Essays* (1881); *India: What can it Teach us?*, lectures at Cambridge (1883; Ger. trans., Leipzig, 1884); *Six Systems of Indian Philosophy* (1899); *Auld Lang Syne* (1st and 2d series, 1899); *Rāmakrishna, his Life and Sayings* (1899). His translation of Kant's *Critique of Pure Reason*, with a scholarly introduction, appeared in two volumes (1881; 2d ed., New York, 1896). He wrote a romance, *Deutsche Liebe* (Leipzig, 1857; 14th ed., 1905), and edited Scherer's *History of German Literature* (New York, 1886). He was one of the foreign members of the Institute of France, a Knight of the Order "Pour le Mérite," a member of the Privy Council of the Queen of England, besides being the recipient of many honorary degrees. After his death appeared his *Last Essays* (1901) and *My Autobiography* (1901), edited by his son. From 1898 to 1904 his *Collected Works* were issued in 20 volumes. Consult *Life and Letters of the Right Honorable Friedrich Max Müller*, edited by his wife (2 vols., London, 1902), and Winternitz, "Max Müller," in *Anthropologische Gesellschaft Mitteilungen*, vol. xxxi (Vienna, 1901). For a criticism

of his work, consult W. D. Whitney, *Max Müller and the Science of Language* (New York, 1892).

MÜLLER, Friedrich von (1779–1849). A German statesman. He was born at Kenreuth, Bavaria, studied law at Erlangen and Göttingen, and in 1801 entered the administrative employ of Weimar. His greatest political achievement was his inducing Napoleon to keep Weimar independent (1806–07). For this he was rewarded by being ennobled and raised to the post of Privy Councilor. He wrote *Erinnerungen aus den Kriegszeiten von 1806–13* (1851). Müller became Chancellor and Minister of Justice in 1815 and from 1835 to 1848 was a deputy in the Landtag. On his friendship with Goethe, consult Burkhardt, *Goethes Unterhaltungen mit dem Kanzler Friedrich von Müller* (Stuttgart, 1870).

MÜLLER, Fritz. See Müller, Johann Friedrich Theodor.

MÜLLER, Georg Elias (1850–). A German psychologist, born at Grimma in Saxony. He was educated at the universities of Leipzig, Berlin, and Göttingen, receiving the degrees of M.D. and Ph.D. In 1870 he entered the German army as a volunteer and took part in the campaign against France. On returning to academic life he became privatdocent at Göttingen (1876) and professor of philosophy at Czernowitz (1880). After April, 1881, he was professor of philosophy at Göttingen. Müller was the chief organizer in 1903 of the Gesellschaft für experimentelle Psychologie, of which he was thereafter president. His works in psychophysics are classical, and an uninterrupted series of experiments upon memory, begun in 1887 and continued to the present day, entitle him to rank as the foremost authority in that field. He published: *Zur Theorie der sinnlichen Aufmerksamkeit* (1873); *Zur Grundlegung der Psychophysik* (1878); *Zur Theorie der Muskelkontraktion* (1891); *Experimentelle Beiträge zur Untersuchung des Gedächtnisses* (1893), with F. Schumann; *Zur Psychophysik der Gesichtsempfindungen* (1896–97); *Zur Analyse der Unterschiedsempfindlichkeit* (1899), with L. J. Martin; *Experimentelle Beiträge zur Lehre vom Gedächtnis* (1900), with A. Pilzecker; *Gesichtspunkte und Tatsachen der psychophysischen Methodik* (1904); *Zur Analyse der Gedächtnisthätigkeit und des Vorstellungsverlaufes* (vol. i, 1911; vol. iii, 1913).

MÜLLER, Georg Friedrich (1805–98). An evangelist and philanthropist whose work was done in England. He was born at Kroppenstädt, Prussia, near Magdeburg, Sept. 27, 1805. He entered the University of Halle (1825) as a divinity student, although his life was anything but exemplary. Late in that year he was converted and in 1826 began preaching. In June, 1828, he was invited to London by the Society for Promoting Christianity among the Jews, to engage in its service for six months, and in March, 1829, reached London. He settled as pastor of Ebenezer Chapel, Teignmouth, in connection with the Plymouth Brethren (1830); in 1832 he removed to Bristol and was coworker with Henry Craik. While at Teignmouth he gave up pew rents and depended on voluntary gifts, for which a box was placed in the chapel. The result was a largely increased income, and from that time on he would take no salary, depending wholly upon voluntary gifts. In December, 1835, after a visit to the Continent, he published a proposal for the establishment of an orphan house for destitute children bereft of both parents. Spontaneous offers of money and service were received, and the opening of the home was announced May 18, 1836. At the end of 1856 there were 297 orphans under his care. The number of orphans increased, and the buildings were multiplied, until in 1875 "2000 children were lodged, fed, and educated, without a shilling of endowment, without a committee, without organization, by funds drawn from all parts of the world." In 1849 he moved the orphanage to Ashley Down, a suburb of Bristol, to specially constructed buildings. Late in life, attended by his wife, he made evangelistic tours all over the world. His *Narrative* and other books and pamphlets had a large sale and gave information of his work. He died at Ashley Down, March 10, 1898. Consult his biography by A. T. Pierson (New York, 1899) and by Warne (ib., 1911).

MÜLLER, Gerhard Friedrich (1705–83). A German historian, born at Herford in Westphalia and educated at Leipzig. Entering the newly established St. Petersburg Academy, he gave instruction in history, geography, and Latin and was soon appointed professor of history. In 1740 he went to Siberia and traveled for 10 years, engaged in the study of its antiquities and geography. Of his great work on Siberia only one volume was published (1750). On his return he became historiographer to the Empire and in 1766, after many attacks by his colleagues, was appointed keeper of the national archives. He drew up for the government a collection of its treatises and wrote a number of works on Russian history, in which subject he was a high authority. His most important book, *Collection for the History of Russia*, appeared at St. Petersburg in nine volumes (1732–65). His work in geography and cartography was also important.

MÜLLER, Iwan Ritter von (1830–). A German classical scholar. He was born at Wunsiedel in Bavaria, studied at Erlangen, and was professor at this university (1862–93) and at Munich (1893–1906). His published works are numerous; he is best known as general editor of the comprehensive *Handbuch der klassischen Altertumswissenschaft* (1885–1906), and also as the editor of many of the works of Galen (q.v.) and as reviser of Nägelsbach's *Lateinische Stilistik* (6th ed., 1888). He published also many articles in learned periodicals and from 1884 to 1897 was editor of Bursian's *Jahresbericht über die Fortschritte der klassischen Altertumswissenschaft*.

MÜLLER, Johann Friedrich Theodor, known as Fritz Müller or Müller-Desterro (1822–97). A German naturalist, known for his contributions to bionomics and to the evolution theory. He was born at Windisch-Holzhausen, near Erfurt. He studied at Greifswald and Berlin. The troubles of 1848 finally drove him from home and Berlin, and he emigrated to southern Brazil, settling at Blumenau. Here he lived the life of a colonist and pioneer until 1856, when he became a teacher of mathematics and natural history in the Gymnasium at Desterro on the island of Santa Catharina. After various changes he was in 1874 appointed *naturalista viajante* of the museum at Rio de Janeiro and lived at Itajahy. Afterward he was suddenly dismissed from his position, with-

out any explanation from the authorities, and returned to Blumenau.

Müller published numerous papers on jellyfishes and worms, but more particularly on crustaceans and insects, his articles appearing mostly in Wiegmann's *Archiv für Naturgeschichte*, *Kosmos*, *Natur* and in the *Annals* of the Rio de Janeiro Museum. His single book, *Facts for Darwin*, was called out by Darwin's *Origin of Species*, and it gave him wide fame. It was written at Desterro in 1863, was published at Leipzig in 1865, and was translated, with some additions, into English in London in 1869. It was the application of Darwinian principles to certain forms of a single class, the Crustacea. In this book we have, in the chapter on the "Progress of Evolution," the first clear statement of the biogenetic law or recapitulation theory afterward restated by Haeckel. He conducted an extensive correspondence with Darwin, who considered Müller's observations of the greatest value in connection with the evolution theory. Müller also proposed the theory of mimicry which bears his name. See MIMICRY.

MÜLLER, JOHANN GOTTHARD VON (1747–1830). A German line engraver, born at Bernhausen, near Stuttgart. He went to Paris in 1770 and studied for six years under Wille. While in the capital he won a number of prizes and was elected to the French Academy. In 1776 Duke Charles recalled him to Stuttgart, where he taught for nine years, and whence he was summoned to Paris to engrave a portrait of Louis XVI, after Duplessis. Next in importance to this is his engraving of Trumbull's "Battle of Bunker Hill." On his return to Stuttgart he became director of the school of engraving. He was elected a member of the principal European academies and was knighted in 1818. He engraved 33 plates in all, of which, besides those mentioned, the best are: "Madonna della Sedia," after Raphael; "Schiller," after the portrait by Graf; "St. Cecilia," after Domenichino; "Wille," after Greuze; "Madame Vigée-LeBrun," after the portrait by herself. Müller was one of the finest engravers of the late eighteenth and early nineteenth centuries, excelling particularly in portraiture.

MÜLLER, JOHANNES (1436–76). The real name of the German scientist Regiomontanus (q.v.).

MÜLLER, JOHANNES (1801–58). The most masterful, accurate, and influential physiologist and morphologist of his time. He was born at Coblenz, Rhenish Prussia, July 14, 1801. He began to study theology, but abandoned it for medicine, beginning his medical studies at Bonn. While there he prepared a prize essay, *De Respiratione Fœtus* (1821). He graduated in 1822 and in 1823 went to Berlin and studied with Rudolphi, returning to Bonn as privatdocent of physiology and comparative anatomy. In 1826 he was promoted to be professor extraordinarius and in 1830 to a full professorship. In 1833 he was called to Berlin, where he succeeded Rudolphi as professor of anatomy and physiology. After Meckel's death he edited the *Archiv für Anatomie, Physiologie, und wissenschaftliche Medicin* and remained at Berlin until his death, which occurred April 28, 1858.

With his unusual powers of application, thoroughness, and breadth, his acuteness and penetration, young Müller opened up in different directions new fields of research. In 1826 he published an important work on specific nerve energies—*Ueber die phantastischen Gesichtserscheinungen;* in the same year an explanation of the color sensations produced by pressure on the retina—*Zur vergleichenden Physiologie der Gesichtssinnes der Menschen und der Thiere;* in 1827 a work based on his lectures on physiology; in 1829 his work on general pathology; and in 1833 the first part of his epoch-making *Handbuch der Physiologie des Menschen* (Eng. trans., *Elements of Physiology*, 1837–43). This was completed in 1840. In 1834 Müller was elected a member of the Berlin Academy of Sciences. As a physiologist, he was the founder of a new school, working by novel methods. To him physiology owes the foundation of Bell's law, the principle of reflex movements and other nervous activities; comprehensive and detailed views on vision and hearing; a thoroughly well-grounded knowledge of the nature of the blood, lymph, and chyle; the proof of the independence of the quality of glandular secretions from the grosser structure of the glands; and the knowledge of chondrin. An opponent of the school of nature philosophers, Müller placed physiology on a sound basis and led in the development of the new morphology. The science of comparative embryology was greatly enriched by his researches. He discovered the pronephric ducts which bear his name, explained the nature of hermaphroditism, and made extended contributions to and laid the foundations of our knowledge of the embryology and metamorphoses of the echinoderms. His examination into the mode of development of certain sharks led to his subsequent studies on the ganoids and *Amphioxus*. Müller also experimented on the vocal cords and the voice, advanced the theory of color contrast, and demonstrated the bristle cells of the inner ear. The debt morphology owes him is shown in his discovery of the lymph hearts of the Amphibia; the micropyle of the eggs of fishes, holothurians, and the like; the intimate structure of glands, of cartilaginous and bony tissue, of erectile tissue, of the musculature of the intestines, and the finer structure of the peritoneum. It was he who introduced the idea of fever as a nervous reflex.

Müller's principal work in comparative anatomy and morphology was his *Vergleichende Anatomie der Myxinoiden, etc.* (1835–41). His unfinished work, *Ueber den feinern Bau der krankhaften Geschwülste* (1838), was of great importance in pathological anatomy. In collaboration with Henle he published *Systematische Beschreibung der Plagiostomen* (1841), and in systematic zoölogy most important were *System der Asteriden* (1842), with Troschel, and *Horæ Ichthyologicæ*. Besides these he published upward of 250 articles, addresses, and reports, most of which appeared in the *Abhandlungen der berliner Akademie der Wissenschaften* and in the *Archiv für Anatomie, etc.*, and nearly all of which were of great significance. In 1899 the city of Coblenz, his native town, erected a monument to Müller.

Consult the biographical notices by Du Bois-Reymond (*Abhandlungen der berliner Akademie der Wissenschaften*, 1859), containing a list of his works; Virchow, *Johannes Müller: Eine Gedächtnisrede* (Berlin, 1858); Bischoff, *Ueber Johannes Müller und sein Verhältnis zum jetzigen Standpunkt der Physiologie* (Munich,

1858); *Proceedings of the Royal Society of London*, vol. ix, p. 556.

MÜLLER, Johannes von (1752–1809). A German historian. He was born Jan. 3, 1752, at Schaffhausen, where his father was a clergyman and rector of the Gymnasium. He studied theology at Göttingen under Heyne, Schlözer, Walch, and others. In 1772, after being admitted to the ministry, he was appointed professor of Greek at Schaffhausen and in the same year published his first work, *Bellum Cimbricum*. In 1778 he went to Geneva, where he studied history at the university and devoted his leisure hours to the investigation of Swiss chronicles and documents. In 1780 he published his *Geschichte der Schweizer* and in 1781 was called to the Collegium Carolinum at Cassel as professor of history and statistics; at Cassel he wrote *Reisen der Päpste* (1782; new ed., 1831). In 1786 he was appointed librarian and councilor of state to the Elector of Mainz; here he started his *Geschichte der schweizerischen Eidgenossenschaft* (5 vols., 1786–1808), his *Zur Darstellung des Fürstenbundes* (1787), and *Briefe zweier Domherren* (1787). In 1787 he was in Rome, became Privy Councilor in 1789, and was knighted by the Emperor in 1791. In 1792 he went to Vienna, where the Emperor made him a member of the Aulic Council (1793), and where he in 1800 became first Imperial librarian. In 1804 he left Vienna for Berlin, where he wrote, among other things, an additional volume of his Swiss history. Introduced to Napoleon after the battle of Jena, he was appointed by him (1807) Secretary of State in the new Kingdom of Westphalia. He died at Cassel, May 29, 1809. His works have all been replaced by more modern researches, but in their own day they were of great value. Besides those mentioned, the *Vierundzwanzig Bücher allgemeiner Geschichte*, based on lectures delivered in Geneva (1811 and often republished), are important. Müller's *Sämmtliche Werke* were published (27 vols., Stuttgart, 1810–19; new ed., 40 vols., 1831–35).

MÜLLER, Josef (1855–). A German writer on philosophy and religion. He was born and educated in Bamberg, studied theology and philosophy, was ordained a priest in 1877, but in 1887 retired from clerical work and became a leader of the Reform Catholic movement in Germany, editing its organ, *Renaissance*, from 1900 to 1907. Among his books the most important are those on Richter—including *Jean Paul und seine Bedeutung für die Gegenwart* (1894), *Die Seelenlehre Jean Pauls* (1894), *Jean Paul-Studien* (1900), and a biography (1913)—and *Das Wesen des Humors* (1896); *Philosophie der Schönheit* (1897; 2d ed., 1912); *Keuschheitsidee* (1897; 2d ed., 1912); *Reformkatholizismus, die Religion der Zukunft* (1899; 2d ed., 1900); *Das sexuelle Leben* (3 vols., 1902–04); *Das Bild in der Dichtung* (2 vols., 1903–06); *Moralphilosophische Vorträge* (1904). Consult the autobiographic volume, *Das Leben eines Priesters in unsern Tagen* (Munich, 1903).

MÜLLER, Julius (1801–78). A German theologian. He was born at Brieg in Silesia and was a brother of Karl Otfried Müller (q.v.). He studied at Breslau and Göttingen, at first devoting himself to law, but afterward to theology. In 1825 he was appointed pastor at Schönbrunn and Rosen, near Strehlen, where he remained seven years. He was appointed in 1831 second university preacher in Göttingen, and there lectured on practical theology and pedagogics. In 1834 he became extraordinary professor of theology in Göttingen and soon after full professor in Marburg, whence he went in 1839 to occupy a similar chair in Halle. The work on which his reputation as a theologian chiefly rests is *Die christliche Lehre von der Sünde* (1839; 6th ed., 1889; Eng. trans., from the 5th ed., Edinburgh, 1868), the most exhaustive treatise in all theology on the subject. He also issued *Dogmatische Abhandlungen* (1870). He afterward published pamphlets on subjects of temporary interest, particularly in vindication of the cause of evangelical union against the attacks of the rigid Lutherans. In conjunction with Neander and Nitzsch he edited a periodical entitled *Deutsche Zeitschrift für christliche Wissenschaft und christliches Leben*. Consult his biography by M. Kahler (Halle, 1878) and by L. Schultze (Bremen, 1879); also J. L. Schultze, *Julius Müller als ethiker* (Bremen, 1895).

MÜLLER, Karl Otfried (1797–1840). A German archæologist and philologist, born at Brieg in Silesia. He studied at Breslau and Berlin, where he was the pupil of August Boeckh. His dissertation, *Ægineticorum Liber* (1817), showed the direction of his future studies, which were devoted to the reconstruction of the history of Greek localities and races. In 1817 he was appointed a teacher at the Magdaleneum in Breslau, in 1819 professor extraordinarius of philology at Göttingen, and in 1823 professor ordinarius there. In connection with his studies he traveled widely and in 1839 secured leave of absence for a visit to Greece and Italy. A sunstroke received while he was copying inscriptions at Delphi led to an attack of fever, from which he died at Athens, where he was buried on the Hill of Colonus. His desire to reconstruct the entire ancient life naturally led Müller to a wide range of scholarly activity. His great work was to be his *Geschichte hellenischer Stämme und Städte*, of which he completed volume i, *Orchomenos und die Minyer* (1820), and volume ii, *Die Dorier* (1824); a second edition of these works was prepared by Schneidewin (1844; trans. by G. C. Lewis and H. Tufnell, London, 1839). In the same field belonged his treatise, *Ueber die Wohnsitze, Abstammung und ältere Geschichte des macedonischen Volks* (1825), and his *Etrusker* (1828; 2d ed. by Deecke, 1877). His *Handbuch der Archäologie der Kunst* (1830; 3d ed. by Welcker, 1846; trans. by Leitch, London, 1850), though now antiquated in its collections, is of value from the many acute observations it contains. It was accompanied by Müller and Oesterley's *Denkmäler der alten Kunst* (Göttingen, 1834–39), which was continued and completed by Wieseler (1846–56). A third edition appeared in 1877–81; a fourth edition of part ii, *Kunstmythologie*, was begun at Leipzig in 1899. His *Prolegomena zu einer wissenschaftlichen Mythologie* (1825) was based on his belief that the elements of the Greek religion were to be found in analysis of the myths, which would refer the specific names to specific places and tribes. In the last years of his life he undertook to prepare, for the English Society for the Diffusion of Useful Knowledge, a history of Greek literature. A translation by Lewis and Donaldson from the author's manuscript, entitled *A History of the*

Literature of Ancient Greece, an excellent book, was published in London in 1840 and again, with a continuation by Donaldson, in 1858; in volume i there is an essay by Donaldson "On the Life and Writings of Karl Otfried Müller." The German original, *Geschichte der griechischen Litteratur bis auf das Zeitalter Alexanders* (1841; 4th ed., revised and continued by E. Heitz, 1882–84), was published by his brother after his death, as well as *Kleine deutsche Schriften* (1841). A collected edition of *Kunstarchäologische Werke*, in five volumes, was published in Berlin (1872–73). Müller was also prominent as an editor. His fine edition, with German translation, of *Æschylus' Eumenides* (Göttingen, 1833) gave rise to a fierce controversy with Gottfried Hermann and his school, while his critical editions of Varro, *De Lingua Latina* (Leipzig, 1833), and Festus, *De Significatione Verborum* (ib., 1839), were long standards and are still valuable. For his biography, consult: F. Ranke (Berlin, 1870); C. Dilthey, *Otfried Müller* (Göttingen, 1898); O. and E. Kern (eds.), *K. O. Müller: Lebensbild in Briefen an seine Eltern* (Berlin, 1908); J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

MÜLLER, Lauro Severiano (1863–). A Brazilian statesman, born in Santa Catharina. He entered the military school in 1882 and later took an active part in the organization of the movement which established the Republic (1889). He was a member of the Constituent Assembly, serving on the committee which elaborated the republican constitution of Feb. 24, 1891. Afterward he served as deputy and Senator from Santa Catharina to the National Congress. In 1902 he was appointed Minister of Industry, Communications, and Public Works and in this position fostered numerous public improvements, including especially railways and port projects. In 1912 he became Minister of Foreign Affairs. In the endeavor to promote better relations with all the other American republics he made official visits to the United States in 1913, and to Uruguay, Argentina, and Chile in 1915.

MÜLLER, Leopold (1834–92). An Austrian genre painter, born in Dresden of Austrian parents. He was a pupil of Karl Blaas and of Christian Ruben at the Academy in Vienna and worked eight years as an illustrator for the Vienna *Figaro*. Continuing his studies subsequently, he repeatedly visited Italy and Egypt, and made his name favorably known through a series of scenes from popular life in Italy and Hungary. His best works, however, are his Oriental paintings and sketches, which possess great ethnographic exactness and delicacy and charm of color. Such are "Street Scene in Cairo" (Metropolitan Museum, New York); "Pilgrims to Mecca Resting," "Bedouins in Camp," "Young Copt Woman" (New Pinakothek, Munich). Other works include "The Church of the Carmelites"; "In the Cellar" (Rudolfinum, Prague); "The Little Mother" and "Last Task of the Day" (both in the Vienna Museum).

MÜLLER, Lucian (1836–98). A German Latinist. He was born at Merseburg and studied at the universities of Berlin and Halle, as well as in Holland. In 1869 he published *Geschichte der klassischen Philologie in den Niederlanden*. In 1870 he was made professor of the Latin language and literature at the Imperial Philologico-Historical Institute at St. Petersburg. His works, which display great erudition and critical acumen, are marred by his bitter attacks on eminent scholars whose opinions differ from his own. They include his famous *De Re Metrica Poetarum Latinorum præter Plautum et Terentium* (1861; 2d ed., 1894); *Metrik der Griechen und Römer* (2d ed., 1885), a brief but excellent treatise, translated by S. B. Platner (1892); editions for the *Bibliotheca Teubneriana* of *Horace* (2d ed., 1879), of *Catullus* (1870), and other Latin poets; editions of *Lucilius* (1872), *Phædrus* (1877), *Ennius* (1884), *Nævius* (1885); Horace's *Odes and Epodes*, with German commentaries (1882); *Nonius Marcellus* (1888); Horace's *Satires and Epistles* (1891–93). His treatise entitled *Ein Horazjubiläum* (1892) contains a short autobiography. Consult also J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

MÜLLER, Max. See Müller, Friedrich Max.

MÜLLER, Morten (1828–1911). A Norwegian landscape painter, born at Holmestrand on the Christiania Fiord. After studying in Düsseldorf (1847–50), first under Tidemand and Gude, then at the Academy under Schirmer, he lived in Stockholm, where in King Karl XV he found a warm friend and patron, and in 1866 went to Christiania, where (1870–73) with K. Bergslien he conducted Eckersberg's school for painting, subventioned by the government. In 1873 he removed again to Düsseldorf, and in 1874 was made a member of the Swedish Academy and court painter. The rugged grandeur of the fiords and mountainous woodland fastnesses of his native country are the favorite subjects of his characteristic landscapes, in which he combines a romantic conception of nature with purely realistic color effects. Representative examples are a "View on Christiania Fiord" (1855) and "Entrance into Hardanger Fiord" (both in the National Gallery, Christiania); "Pine Forest in Norway" (1860, Hamburg Gallery); "Romsdal Fiord" (1876); "Forest Lake by Moonlight" (1892).

MÜLLER, Otto (1816–94). A German novelist. He was born at Schotten in Hesse, was for some time connected with the court library at Darmstadt, and edited newspapers at Frankfort and Mannheim. In 1854 he established the *Frankfurter Museum*. He was the author of novels, *Charlotte Ackermann* (1854); *Der Stadtschultheiss von Frankfurt* (3d ed., 1878), treating of Goethe's grandparents; *Aus Petrarcas alten Tagen* (1861); *Der Majoratsherr* (1873); *Schatten auf Höhen* (1881). Consult the biography by Schulte vom Brühl (Stuttgart, 1895).

MÜLLER, Otto Frederik (1730–84). A Danish zoölogist, born in Copenhagen. His contributions to the knowledge of Infusoria are especially valuable. He wrote: *Fauna Insectorum Friedrichsdaliana* (1764); *Flora Friedrichsdaliana* (1767); *Vermium Terrestrium et Fluviatilium, seu Animalium Infusoriorum Helminthicorum et Testaceorum non Marinorum Succincta Historia* (2 vols., 1774); *Zoölogia Danica s. Animalium Daniæ et Norvegiæ Descriptiones et Historia* (2 vols., 1777–80; 3d ed., 4 vols., 1789–1806).

MÜLLER, Peter Erasmus (1776–1834). A Danish theologian and antiquary. He was born in Copenhagen and studied at the university there, passing his theological examination in 1791. After spending some time in German universities, he visited France and England. Returning, he wrote numerous works; was appointed professor of theology at the University of Copenhagen in 1801, and in 1830 became Bishop of Zealand, the highest ecclesiastical dignity in Denmark. He was an eminent theologian, and his theological works, including that on the Christian moral system (1808) and other volumes, are highly valued. But his literary reputation rests upon his essays on Danish and Norse antiquities, of which the most valuable are: *Om det islandske Sprogs Vigtighed* (1813); *Kritisk Undersögelse af Danmarks og Norges Sagnhistoire* (1823–30); and, above all, his *Sagabibliothek* (*Library of the Sagas*) (1816–18).

MÜLLER, Sophus Otto (1846–). A Danish archæologist, born in Copenhagen, the son of Dr. C. L. Müller, archæologist and numismatist. He studied philology in his native city, where he obtained the doctorate (1880) with the important essay *Dyreornamentiken i Norden.* In 1878 he became assistant in the Museum of Archæology, in 1885 inspector, and in 1892 a director in the National Museum. As secretary of the Royal Archæological Society (after 1881) he edited *Aarböger for Nordisk Oldkyndighed* and *Nordiske Fortidsminder,* to which he made numerous learned contributions on Danish archæology. His principal works are *Ordning af Danmarks Oldsager* (2 vols., 1888–95), with 1300 illustrations, and *Vor Oldsid* (1897), both fundamental works on Danish archæology. With C. Neergaard he wrote *Danevirke, arkæologisk undersögt, beskrevet og tydet* (1901).

MÜLLER, Therese. See Malten, Therese.

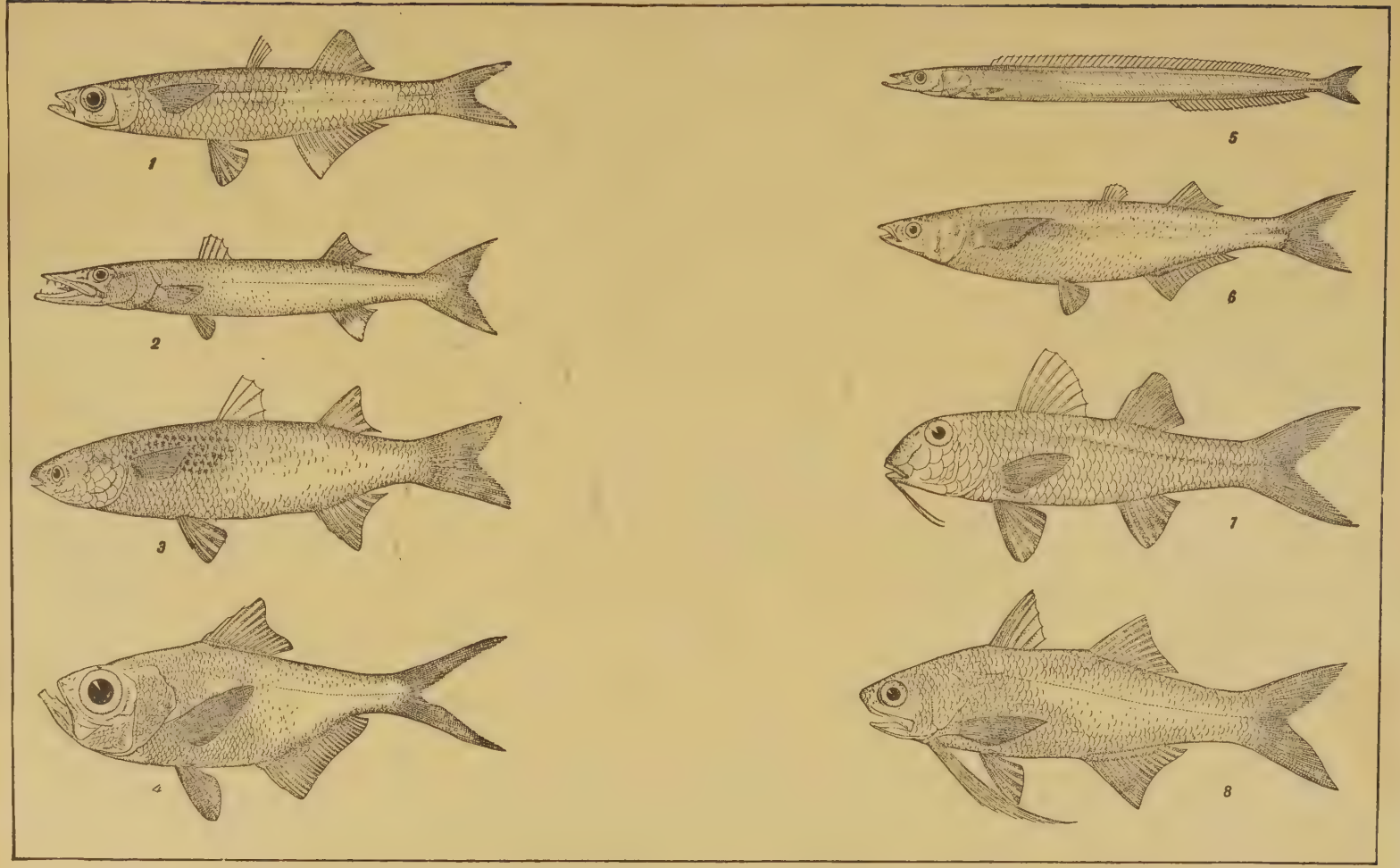
MÜLLER, Victor (1829–71). A German historical painter. He was born in Frankfort, where he received instruction at the Städel Institute under Steinle. He studied afterward at the Antwerp Academy and under Couture in Paris, but became a follower of Courbet, whose technique, the reverse of Couture's, he adopted and subsequently helped to promote in Germany. In 1858 he returned to Frankfort, where he soon attracted attention with a series of pictures, romantic in subject but thoroughly realistic in conception and treatment and of great coloristic charm, but scarcely understood by a public accustomed to the sentimental trend of the Düsseldorf school of that period. Therefore, in 1865, he removed to Munich, where such revolutionary departures from traditional treatment as the "Sleeping Wood-Nymph" (1863) and "Hero and Leander" were more likely to be appreciated. Out of a cycle from Shakespeare which he painted there "Hamlet in the Graveyard" (1869, Städel Institute, Frankfort) is surpassed only by the "Balcony Scene in Romeo and Juliet" (New Pinakothek, Munich). Another of the series, "Ophelia," and two scenes from the "Life of Hartmuth von Cronberg" are also in the Städel Institute, Frankfort. His power as a landscape painter is shown in a "Scene from *Les Misérables*" and "Faust on the Promenade," and his charming fairy pictures prepared the way for those of Hans Thoma. To his influence as a colorist was due not only the introduction of the tone element into the paintings of the Munich school, but also the truer conception of historical characters and a more wholesome observation of nature among the younger generation of artists.

MÜLLER, Wilhelm (1794–1827). A German poet, excelling in popular and political songs that attracted great composers, notably Schubert, and also influenced Heine's lyric development. Müller, who was born in Dessau, Oct. 7, 1794, studied philology and history, fought in the War of Liberation, visited Italy (1817–19), was made professor in the Gelehrtenschule at Dessau (1819), and ducal librarian there. He died in Dessau, Sept. 30, 1827. His poems, published under the titles *Müllerlieder* (1818), *Gedichte eines Waldhornisten* (1821), *Lieder der Griechen* (1821–24), *Lieder des Lebens und der Liebe* (1824), *Lyrische Reisen* (1827), were collected with other *Works* by Schwab in five volumes (1830). An excellent edition by Müller's son, the Orientalist, Friedrich Max Müller (q.v.), appeared in 1868; the *Poems* were published in one volume (1874). A complete critical edition by J. T. Hatfield appeared in 1906 (Berlin). Consult B. Hake, *W. Müller, Leben und Dichten* (Berlin, 1908).

MUL'LER, William James (1812–45). An English landscape and figure painter, born at Bristol, whither his father, a Prussian scholar, had migrated. He studied with James Pyne, landscape painter, and in 1833 exhibited for the first time at the Royal Academy the "Destruction of Old London Bridge, Morning." He spent seven months traveling in Germany, Switzerland, and Italy, and in 1838 he visited Greece and Egypt. In 1841 he published his "Picturesque Sketches of the Age of Francis I," the fruits of a visit to France, and the same year he joined the government expedition to Lycia, the results of which were paintings of Oriental life and scenery, five of which were exhibited at the Royal Academy in 1845. Among these are "The Tent Scene, Xanthus," the "Burial-Ground at Smyrna," and "Head of a Cingari." A fine collection of the sketches made at this time is in the British Museum. He is excellently represented in the Tate Gallery by about 80 paintings and sketches in oil and water color, and in the South Kensington Museum by a number of water-color drawings. Muller died at Bristol. His art was original and powerful. His English landscapes are perhaps wanting in simplicity and local color and atmosphere, but his glowing Eastern scenes, with their broad brushwork, admirable light effects, and pure strong color, place him in the foremost ranks of painters of the Orient. Consult the *Memoir* by Solly (London, 1875).

MÜLLER, mŭ'lēr, W(ilhelm) Max (1862–). An American Oriental scholar, born at Gleisenberg, Germany, and educated at Erlangen, Berlin, Munich, and Leipzig, where he received his Ph.D. After 1888 he resided in the United States, and after 1890 he occupied a chair in the Reformed Episcopal Seminary in Philadelphia. During various periods he was engaged in archæological researches in Egypt, being sent there in 1904, 1906, and 1910 by the Carnegie Institution. Müller also lectured on Egyptology at the University of Pennsylvania. His writings include: *Asien und Europa nach altägyptischen Denkmälern* (1893); *Die Liebespoesie der alten Aegypter* (1899); *Egyptological*

MULLETS AND ALLIES



1. GULF SILVERSIDES (Menidia peninsulæ).
2. BARRACUDA (Sphyræna barracuda).
3. COMMON MULLET (Mugil cephalus).
4. SLIMEHEAD (Beryx splendens).
5. SAND-EEL (Ammodytes Americanus).
6. CALIFORNIA 'SMELT' (Atherinopsis Californiensis).
7. AMERICAN SURMULLET (Mullus auratus).
8. GULF BARBUDO (Polydactylus Virginicus).

Researches (1906, 1910 et seq.). He was also a contributor to the *Encyclopædia Biblica* and the *Jewish Encyclopædia*, and after 1905 served as joint editor of the *Gesenius Hebrew Dictionary*.

MÜLLER, WOLFGANG, called MÜLLER VON KÖNIGSWINTER (1816–73). A German poet and novelist, born at Königswinter on the Rhine. He studied medicine at Bonn and practiced at Düsseldorf, but afterward removed to Cologne and gradually gave up medicine to devote himself to literature. Müller's poetry finds its material in the Rhine, its beauty, its legends, and the life of its people. The more important of his books are: *Gedichte* (1847; 3d ed., 1868); *Der Rattenfänger von Sankt Goar* (1856); *Liederbuch* (1857; 4th ed., 1871); *Lorelei*, an epic cycle (1851; 4th ed., 1873); *Erzählungen eines rheinischen Chronisten* (1860–61); *Im Rittersaal* (1874). His best-known poem is "Mein Herz ist am Rhein." Six volumes of his selected poems were published under the title *Dichtungen eines rheinischen Poeten* (1871–76). Consult Joesten, *Wolfgang Müller von Königswinter* (Cologne, 1895).

MÜLLER-GUTTENBRUNN, gu'ten-brun, ADAM (1852–). An Austrian author, sometimes using the pseudonym Ignotus, born at Guttenbrunn and educated at Hermannstadt and Vienna. In 1879 he removed to Vienna from Linz. His first success was *Des Hauses Fourchambault Ende* (1880), supplementing Augier's drama *Les Fourchambault*. This was followed by *Im Banne der Pflicht* (1882), the comedy *Schauspielerei* (1883), with Laube, and *Irma* (1885). Among his novels and stories, which for the greater part appeared serially, the best known are: *Frau Dornröschen* (1884; 3d ed., 1891); *Gescheiterte Liebe* (1889); *Die Magyarin* (1896); *Götzendämmerung* (1908); *Der kleine Schwab* (1910; 10th ed., 1912); *Die Glocken der Heimat* (1911; 8th ed., 1912); *Es war einmal ein Bischof* (1912); *Der grosse Schwabenzug* (1913).

MÜLLER-URY, ADOLFO (1864–). A Swiss-American portrait painter. He was born in Airolo, Switzerland, and studied under Deschwanden in Switzerland, at the Munich Academy, and at the Ecole des Beaux-Arts, Paris, under Cabanel. After spending two years (1883–85) in Rome, he came to America in 1886. Although he painted many religious pictures, he is best known for his portraits of prominent personages in Europe and America. These include Pope Pius X, Cardinals Hergenrother, Hohenlohe, and Merry del Val, Lord and Lady Strathcona, Lord Mount Stephen, Emperor William II (1909, New Palace, Potsdam), President William McKinley, General F. D. Grant, Senator and Mrs. Chauncey M. Depew, J. Pierpont Morgan, and James J. Hill.

MUL'LET (OF., Fr. *mulet*, dim. of *mulle*, from Lat. *mullus*, red mullet). Any one of a variety of useful fishes, principally of the family Mugilidæ. In this family the body is nearly cylindrical, with large scales and two widely separated dorsal fins, the first with four stiff spines. The mouth is small. The best-known mullets belong to the genus *Mugil*, of which there are many species found in all warm waters. The common or striped mullet (*Mugil cephalus*) is the largest (10 to 12 pounds) and best of all. It occurs on both coasts of America, and also in Europe. It often ascends rivers, and searches for soft or fat substances for food, frequently obtained by thrusting its mouth into the mud. It is easily reared in ponds, readily answers the call which usually summons it to be fed, and was in great request among the ancients. Mullets are used fresh, salted, and smoke-dried. A preparation of their roe, called botarcha, is in great esteem as a condiment in Italy and the south of France. They are often caught in the Mediterranean by angling from a rock, with a bait paste, when they have been previously attracted to the spot by macaroni thrown into the water. The white or blueback mullet (*Mugil curema*) is found on both shores of America, and is of importance as a food fish. An abundant species about the Florida Keys is the fan-tailed mullet (*Mugil trichodon*). Mullets are very numerous in surface-swimming shoals in the lagoons of the Gulf coast in late winter and spring, and are captured generally by means of casting nets. Among the fishermen of Spanish America, mullets are called liza, lizita, and macho, with descriptive adjectives for the various species.

The name is also given in the western and southern United States to various suckers of the genus *Moxostoma*. Consult G. B. Goode, *Fishery Industries*, sec. i (Washington, 1884). See Plate of MULLETS AND ALLIES.

MULLET (OF. *molette*, *mollette*, Fr. *mollette*, rowel, from Lat. *mola*, millstone). In heraldry, a charge (originally interchangeable with the estoile) in the form of a star, generally with five points, intended to represent a spur rowel. See CADENCY.

MULLET, ABRAM B. (c.1820–1890). An American architect, born in Ohio. His professional training was obtained in the offices of local architects. In 1865 he was appointed supervising architect of the Treasury, having charge of the design and construction of all Federal buildings, which post he occupied until 1875. He designed the War, State, and Navy Department Building at Washington, the post offices of New York and Boston, and many other important buildings, in a hard and mechanical version of the French Renaissance style. While his work wholly lacked artistic refinement, it set an example of solid and durable construction at a time when not only artistic taste but apparently all sense of good building seemed to be dead in the United States.

MUL'LIGAN LETTERS. A series of letters written by James G. Blaine (q.v.) to Warren Fisher, a business associate, which, it was alleged, proved corrupt connection, on the part of Blaine, with legislation in Congress favoring the Little Rock and Fort Smith Railroad and the Northern Pacific Railroad. The letters were obtained from Fisher by one James Mulligan, a former clerk of Fisher, who had been called to Washington to testify before a committee of the House of Representatives appointed to investigate the charges against Blaine. Blaine obtained the letters from Mulligan, and on June 5, 1876, read them before the House, after defying the committee to compel him to surrender them. The letters were freely used in the presidential campaigns of 1876 and 1884 by the opponents of Blaine, who took full advantage of the suspicious sound of several detached sentences. By the adherents of Blaine it was asserted that the letters did not prove corruption or even participation in discreditable business and political transactions on his part. Consult Peck, *Twenty*

Years of the Republic, chap. i (New York, 1906).

MULLINGAR, mŭl'lĭn-gär'. The capital of County Westmeath, Ireland, on the Brosna, 50 miles west by north of Dublin, with which it is connected by rail and by the Royal Canal (Map: Ireland, D 4). It is a centre for agricultural products, and the most important horse and cattle fairs in Ireland are held here periodically. Pop., 1901, 4500; 1911, 5539.

MULLINGER, mŭl'lĭn-jēr, James Bass (1834–). An English historian, born at Bishop Stortford. He was educated at University College, London, and at St. John's College, Cambridge, where he graduated with high honors. After lecturing in 1881–83 at Bedford College, London, he became lecturer to the Teachers' Training Syndicate, at Cambridge, on the history of education (1885–95), and lecturer on ecclesiastical history in Trinity College (1890–94). He wrote: *The Ancient African Church* (1869); *The University of Cambridge from the Earliest Times to the Decline of the Platonist Movement* (4 vols., 1873–1914); *The Schools of Charles the Great* (1876); *An Introduction to English History*, with S. R. Gardiner (1881; 7th ed., 1913); *The Age of Milton*, with Canon Masterman (1897); *History of St. John's College, Cambridge* (1901).

MULLION (corrupted from *munnion*, from Fr. *moignon*, stump of an amputated limb, from OF. *moign*, from Lat. *mancus*, maimed). A vertical member used to subdivide an opening, as a window or triforium arch, into two or more divisions within the main framework. It was practically unknown to all ancient styles of architecture. In the early Christian (especially Syrian), Byzantine, and Romanesque styles it occurs with increasing frequency in the very simple form of a circular shaft or colonnette (sometimes a small pier) subdividing a window or an arch of a gallery into two arched openings.

It was in the Gothic style that the mullion received a distinctive organic development through the use of tracery owing to the enormous increase in the size of windows and other openings, necessitating the multiplication of minor members. The typical cathedral window has from two to six mullions forming subordinate divisions or lights, and their profiles are varied and rich, being often a group of shafts and a composition of fillet and cavetto moldings. These Gothic mullions are exquisitely slender and far removed from the heavy pre-Gothic mullion colonnette. (See Tracery.) The Renaissance architects abandoned the mullion, returning to the antique idea of undivided openings. Only occasionally is a single colonnette used as a window mullion, especially in early work.

MÜLLNER, mül'nēr, Adolf (1774–1829). A German dramatist and critic, a nephew of G. A. Bürger, born at Langendorf, near Weissenfels, Saxony. He studied law in Leipzig and practiced it at Weissenfels until 1816. Encouraged by the success in an amateur theatre of several comedies, as, e.g., *Der angolische Kater* (1815), skillfully composed after French models, he produced in 1812 a one-act tragedy, *Der neunundzwanzigste Februar*, in imitation of Werner's *Der vierundzwanzigste Februar* (1812), the first of those fate dramas with which the German stage was flooded during the following decade. Surpassing its model in the accumulation of horrors, Müllner's play lacked the innate poetry which was the redeeming feature of Zacharias Werner's (q.v.) production. The same applies to his best-known work, *Die Schuld*, a four-act drama, based on the story of a young man who, according to a prophecy, is destined to kill his brother. This typical fate tragedy was brought out in Vienna in 1813, and subsequently on all the principal stages of Germany, retaining its popularity for some years, although its effectiveness was due mainly to clever technical construction. Consult: Schütz, *Müllners Leben, Charakter, und Geist* (4 vols., Meissen, 1830); Höhne, *Zur Biographie und Charakteristik Müllners* (Wohlau, 1875); Minor, *Die Schicksalstragödie in ihren Hauptvertretern* (Frankfort, 1883); Foth, *Die Schicksals-Idee in der deutschen Tragödie* (Leipzig, 1895).

MULOCK, mū'lŏk, Dinah Maria. An English author. See Craik, Dinah Maria.

MULOCK, Sir William (1843–). A Canadian jurist and statesman, born at Bondhead, Ontario, and educated at the University of Toronto. He was called to the bar in 1868, and practiced his profession in Toronto, where he became one of the leaders of the bar. In 1888 he was made queen's counsel. In 1882 he was elected a Liberal member of the Dominion House of Commons, and in 1896 was made Postmaster-General in the administration of Sir Wilfrid Laurier. The establishment of a penny-postage rate between Canada and other portions of the Empire was mainly due to him, and he also strongly advocated an all-British cable system, and procured direct steamship communication between Canada and South America. While Postmaster-General he introduced legislation establishing the Department of Labor and was its first minister (1900–05). In the latter year he was appointed the first Chief Justice of the Exchequer Division of the High Court of Justice for Ontario. He was vice chancellor of the University of Toronto in 1881–1900. Deeply interested in the movement for international peace and arbitration, in 1907 he was chairman of the board of conciliation respecting the coal strike in British Columbia. In 1902 he was knighted (K.C.M.G.).

MULREADY, mŭl-rĕd'ĭ, William (1786–1863). An Irish genre painter. He was born at Ennis, County Clare, but his father moved to London when William was a child. He early showed artistic powers, which were encouraged by the sculptor Banks, through whose influence he gained admittance to the academy schools. He began as an illustrator of children's books, and his first painting of importance, "Returning from the Ale House," now in the Tate Gallery, London, under the title "Fair Time," appeared in 1809; his later works, "The Carpenter's Shop," "Punch," and "Idle Boys," commanded very general attention. Mulready was elected an associate of the Royal Academy in 1815, and the following year, on the merits of his picture entitled "The Fight Interrupted" (South Kensington Museum), he was made Academician. His subjects, though of the popular order, are painted with great carefulness and fidelity to detail. They are rather small in size, and closely resemble the Dutch school, but are spoiled by gaudy color.

Mulready's most important pictures are in the South Kensington Museum and in the Tate Gallery. In the former are 33, among them "Hampstead Heath" (1806); "Giving a Bite" (1836); "First Love" (1839); "The Sonnet" (1839); "Choosing the Wedding Gown" (1846);

"The Butt" ("Shooting a Cherry") (1848). In the latter are five, including a "Snow Scene." "Young Brother" and "The Toy Seller" are in the National Gallery, Dublin, and his "Wolf and the Lamb" is in royal possession. An early marriage, contracted soon after his arrival in London, was productive of much unhappiness. Throughout his life Mulready was a successful and painstaking teacher. Consult Stephens, *Memorials of Mulready* (London, 1867).

MULTAN, or **MOOLTAN**, mōōl'tän'. The capital of a district of the same name, Punjab, British India, 190 miles southwest of Lahore and 4 miles from the left bank of the Chenab, the inundations of which sometimes reach the city (Map: India, B 2). It possesses railway communication with all the principal cities of India and has, in the Indus Valley Railway, a commercial outlet from Central Asia, the Punjab, and the United Provinces, to the Arabian Sea at Karachi. Steamers ply to Hyderabad, a distance of 570 miles. The city, situated in a district remarkable for its fertility, is built on a mound consisting of the ruins of ancient cities, and is surrounded by a dilapidated wall from 10 to 20 feet high. Large and prosperous suburbs have grown up in recent times. The vicinity abounds in mosques, tombs, and shrines, attesting the city's antiquity and former magnificence. The most important of these, situated in the old fort, is the tomb of Rukn ul Alam (pillar of the world), dating from 1340, an octagonal red-brick structure covered with multicolored glazed tiles and raised mosaics and forming a conspicuous object in the surrounding landscape. The tomb of Bhawal Hakk, dating from 1264, the tomb of Shams i Tabrīz, and the Hindu temple of the Narasingh Avatār of Vishnu are also noteworthy. The bazars are numerous, extensive, and well stocked, and the stores are adequately supplied with European and Asiatic commodities. There are a fine public garden, several high schools for boys, and a convent school for girls. There are manufactures of silks, cottons, shawls, scarfs, brocades, tissues, carpets, shoes, tin boxes, enamel ware, and pottery, and extensive banking interests, but Multan is most important as a trade centre. It holds an annual horse bazar. The local merchants are proverbially rich. Multan is a military station, with an important cantonment 1½ miles to the east. It was taken by the British in the second Sikh War, in January, 1849. Pop., 1901, 87,394; 1911, 99,243.

MUL'TIPLE (ML. *multiplus*, manifold, from Lat. *multus*, many + *-plus*, fold). An integral number divisible without remainder by another integral number. Thus, 35 is a multiple of 7 and also a multiple of 5. *Equimultiples* are multiples containing different numbers an equal number of times; e.g., 21 and 33 are equimultiples of 7 and 11. The *least common multiple* of several numbers is the least number containing each of them without a remainder. The least common multiple contains all prime factors not common to all of the numbers, and all common prime factors with their highest exponents. Thus, the least common multiple of $5 \cdot 7$ (i.e., 35), $3^2 \cdot 2$ (i.e., 18), and $7^2 \cdot 2^2 \cdot 5$ (i.e., 980) is $5 \cdot 7^2 \cdot 2^2 \cdot 3^2$ (i.e., 8820).

Mathematical expressions which satisfy given conditions for different numerical values are said to be multiple-valued; e.g., $\sin^{-1}x$ (i.e., the angle whose sine is x) is two-valued between 0° and 360°; thus, if the sine equals ½, the angle has two values, 60°, 120°. (See TRIGONOMETRY.) Contacts above the first order between curves or surfaces are called multiple contacts. A multiple point of a curve is a singularity composed of several coincident points; e.g., if the curve crosses itself twice at the same place, the intersection is called a triple point. A double point admits of two tangents, a triple point admits of three tangents, and so on, and these are called multiple tangents.

MULTIPLE PERSONALITY. See DOUBLE CONSCIOUSNESS.

MULTIPLICA'TION (Lat. *multiplicatio*, from *multiplicare*, to multiply, from *multiplex*, manifold, from *multus*, many + *plicare*, to fold, Gk. πλέκειν, *plekein*, to twine). One of the fundamental processes in arithmetic and algebra. In arithmetic the symbol for multiplication is × or the period, the latter being slightly raised in the United States to distinguish it from the decimal point, but not being raised in the European books, where the decimal point is either a comma or a raised period. In algebra the symbol is the period or cross (as in arithmetic) or simple juxtaposition. For example, $a \cdot b$, $a \times b$, ab, are symbols for a times b. Multiplication may be defined as the process by which a number called the *product* is formed from a number called the *multiplier* in the same way that this multiplier is formed from unity. For example, the number — 3 may be formed from unity by the process symbolized as $-(1 + 1 + 1)$, and similarly the product $-3 \cdot 4$ may be formed by the process $-(4 + 4 + 4) = -12$. Elementary multiplication is subject to the associative and distributive laws (qq.v.); but there are branches of higher mathematics in which exceptions occur. (See QUATERNIONS; SUBSTITUTION.) For a method of checking multiplication, see CHECKING.

In a series of operations multiplication takes precedence over addition and subtraction. For example, $2 + 3 \cdot 6 - 4$ equals $2 + 18 - 4$, not $5 \cdot 2$. The operation of multiplication can be abbreviated by the use of logarithms (q.v.), the slide rule (q.v.), or tables of products and factors or of quarter squares. The plan of multiplication by means of Napier's rods (*Rabdologiæ sive Numerationis per Virgulas Libri Duo*, Edinburgh, 1617) has been revived through the manufacture of sets of *réglettes multiplicatrices* planned by Genaille and Lucas (Paris, 1885). Growing out of the demand for a system by which prime numbers could be detected, there appeared, in the seventeenth century, numerous tables in the theory of numbers. In 1728 Poëtius published a table of factors for numbers up to 100,000. In 1770 Lambert arranged such a table in modern form for numbers up to 102,000. Burkhardt's table (1814–17) includes factors of numbers to 36,000, and Crelle, Pase, and Glaisher have carried these to 9,000,000. The oldest of the large tables is that of Crelle (7th ed., with an introduction by Bremiker, Berlin, 1895). This gives the products to $1000 \cdot 1000$. Zimmermann's *Rechentafel* (Berlin, 1889) and Müller's *Multiplicationstabellen* (Karlsruhe, 1897) give the products to $100 \cdot 1000$, and are well arranged. For the products to $100 \cdot 100$, Jordan's *Mathematische und geodätische Hilfstafeln* (9th ed., Hanover, 1895) is one of the best. The most elaborate table of prime numbers is that of Lehmer, which gives all such numbers from 1 to 10,006,721. Products have also been tabulated by means of quarter squares,

a relation known to the Arabs and doubtless of Hindu origin. The construction of these tables depends upon the identity

$$ab \equiv \frac{(a+b)^2}{4} - \frac{(a-b)^2}{4};$$

thus, the product of any two numbers is given by subtracting the quarter square of their difference from the quarter square of their sum. Among the various tables of this type, Laundy's (1856) contains the quarter squares of all numbers up to 100,000. Blater's (Vienna, 1887), complete to 200,000, is regarded as the best. See CALCULATING MACHINES.

MULVA'NEY. A character in Rudyard Kipling's "Soldiers Three" in *Plain Tales from the Hills* (1888).

MULVIAN BRIDGE. See MILVIAN BRIDGE.

MUM. See BEER.

MUM'BO JUM'BO. A strange bugbear described by Mungo Park as common to the Mandingo towns of Africa and used to discipline quarrelsome wives of the natives. The person assuming the character is clothed in a suit made of bark. After various rites the offender is seized by Mumbo Jumbo, stripped, tied, and whipped with his rod. The name is used in a wider sense of negro idols and fetishes, as well as in reference to the secret societies of the West African natives.

MUMFORD, mŭm'fĕrd, JAMES GREGORY (1863–1914). An American physician, born at Rochester, N. Y. He studied medicine at Harvard (M.D., 1890) and practiced in Boston from 1890 to 1912, during which time he taught at Harvard Medical School and was connected with several hospitals. Thereafter till his death he was physician in chief at the Clifton Springs (N. Y.) Sanatorium and Hospital. He is the author of *Mumford Memoirs* (1900); *Narrative of Medicine in America* (1903); *Surgical Aspects of Digestive Disorders* (1907), with A. K. Stone; *Surgical Memoirs and Other Essays* (1908); *One Hundred Surgical Problems* (1911); *Practice of Surgery* (1910; 2d ed., 1913); *A Doctor's Table Talk* (1912).

MUMMERS. See MOMIERS.

MUM'MICHOG (North American Indian name). A small minnow-like fish of sluggish tidal streams of the eastern United States. See KILLIFISH.

MUM'MIUS. 1. LUCIUS MUMMIUS (c.185–130 B.C.). A Roman commander, of plebeian birth. In 146 B.C. he was elected consul and placed in command of the war against the Achæan League. (See ACHÆA.) The first battle, fought near Corinth, resulted in the complete defeat of the Grecian allies. Corinth, Thebes, and Chalcis were plundered and then destroyed by the Roman troops. As trophies of his victory, Mummius caused many of the most valuable works of art to be sent to Rome. The surname of Achaicus was given to Mummius, and a triumph was decreed to him. Cicero speaks of him as a blunt and plain but honest man and says that of all his enormous plunder none was reserved for his own use. In 141 he was again elected consul. Nothing certain is known about his later life or his death. 2. SPURIUS MUMMIUS, brother of Lucius, legate of his brother in Achæa. He is chiefly known as pioneer writer among the Romans of the poetic epistle; he sent humorous letters in verse to friends at Rome describing his experiences in Greece. (Consult Cicero, *Epistulæ ad Atticum*, xiii, 6, 4.) Both brothers had a modest reputation as orators.

MUMMY (Ar., bitumen). Strictly speaking, the word "mummy" is applied to bodies which have been so preserved by one means or another as to defy disintegration for a long time. Thus, there are mummies of the ancient Peruvian race which seem to owe their preservation to the desiccation resulting merely from the dryness of the climate. But by general consent the term has come to be applied usually to bodies, whether of human beings, animals, fish, or reptiles, and even insects, found in Egypt, which have been preserved by the use of bitumen, spices, gums, or natron, a substance made up of carbonate, sulphate, and chloride of soda. Instances are known in which bodies have been preserved by immersion in honey. See EMBALMING.

The oldest mummy in existence for which an authentic date is afforded is that of Seker-em-sa-f, the son of Pepi I, which was found at Sakkara. It dates about 3000 B.C., and the evidence furnished by it indicates that the process of mummifying had already been highly developed by this time. In fact the existence of a stele dating about 4000 B.C. leads to the supposition that as early as this it was practiced with skill.

Owing to the Egyptian belief that a complete body was necessary for the happiness of a man in the next world, the custom of mummifying the body continued until the introduction of Christianity. At this time the Christian's faith in the resurrection tended to bring an end to the mummification of the dead.

The different materials used to preserve the body produced different results in the mummy. The employment of resin gave the skin a greenish color and rendered it like tanned leather. While such substance seems to have preserved the hair and teeth, it rendered the bodies easily breakable when freed from their wrappings. The use of bitumen to fill the abdominal cavity rendered the body black and hard, while natron caused the flesh to fall away from the bones.

In addition to the bodies of human beings the Egyptians mummified those of many animals, reptiles, and insects which were sacred to the gods.

Curiously enough, several centuries ago, the belief was common that the bitumen from mummies was a balm for cuts or bruises, and much of this material, called mummy, was sold for this purpose. Consult: E. A. T. Wallis Budge, *The Mummy* (Cambridge, 1894); G. E. Smith, *A Contribution to the Study of Mummification in Egypt* (Cairo, 1906); C. W. Mead, "Peruvian Mummies and what they Teach," in *American Museum of Natural History, Guide Leaflet No. 24* (New York, 1907).

MUMMY CASE. In ancient Egyptian embalming, the case immediately surrounding the shrouded mummy. It was in the outlines of a human body and was made to fit the corpse. There were usually two mummy cases for each mummy. The inner one was plain, while the outer one was covered with paintings and hieroglyphs recounting the life and deeds of the dead. The material was usually cedar. The double case was inclosed in an oblong coffin, and this in its turn in a sarcophagus. See EGYPT, *Manners and Customs;* EMBALMING; SARCOPHAGUS.

MUMPS (from Dutch *mompen*, to cheat, from *mommen*, to mumble); EPIDEMIC PAROTIDITIS. A popular name of a specific inflamma-

tion of the parotid and rarely of the other salivary glands. It is an infectious, contagious disease, occurring as a rule in epidemics, although isolated cases are often seen. While it chiefly attacks children and adolescents, adults are not exempt.

The disorder usually begins with a feeling of stiffness about the jaws, which is followed by pains, heat, and swelling beneath the ear. The swelling begins in the parotid, but the other salivary glands may become involved, so that the swelling extends along the neck towards the chin. One or both sides may be affected, and, in general, the disease appears first on one side and then on the other. There is seldom much fever. The inflammation is usually at its highest point in three or four days, after which it begins to decline, suppuration of the glands scarcely ever occurring. In most cases no treatment further than due attention to the bowels and protection of the parts from cold by the application of flannel or of cotton is required, and the patient completely recovers in eight or ten days.

A singular circumstance connected with the disease is that in many cases the subsidence of the swelling is immediately followed, in patients past the age of puberty, by swelling and pain in the testes in the male sex and in the ovaries or mammæ in the female. The inflammation in these glands is seldom very painful or long continued. More serious complications are metastasis into the internal ear (producing permanent deafness), meningitis, joint inflammations, and albuminuria.

MUN, mĕn, (Adrien) Albert (Marie), Count de (1841–1914). A French politician and author, leader of the Catholic Anti-Republican party. He was born at Lumigny, graduated at Saint-Cyr in 1862, and fought with distinction in the Franco-Prussian War and against the Commune. Count de Mun was the chief founder, in 1871, of the Circles of Catholic Workmen. He was a member of the Chamber of Deputies in 1876 and from 1881 till his death, except for an interval in 1893. Through his influence the power of the French clergy was thrown to the Boulangists. In 1892 he founded the league of the Sacré Cœur, and on the Pope's instructions promised to work with the Republic for reform if the government would give up its atheism. Count de Mun took a prominent part in the Dreyfus trial. In 1905 he was one of the ablest opponents in parliament of the bill for the separation of church and state. In 1913 he fought hard to have the three-year military law repealed, although he predicted that France would soon be at war with Germany. When war did break out the next year, he made a notably eloquent appeal to France to meet the crisis with courage. (See France.) He was elected to the French Academy in 1897. His published works, especially his speeches, for which he was famous, include: *Discours* (7 vols., 1888–1900); *Lettres adressées à M. Waldeck-Rousseau* (1900); *L'Organisation professionelle* (1901); *Les congrégations réligieuses devant la Chambre* (1903); *Contre la séparation* (1905); *L'Heure décisive* (1913).

MUN, Thomas (1571–1641). An English merchant and economic writer, born in London. As a young man he was engaged in the Mediterranean trade and in 1615 was appointed member of the committee, or director, of the East India Company. In 1621 he published *A Discourse of Trade, from England into the East Indies,* in which he defended the East India Company against the charge that it drained England of bullion. His most important book, *England's Treasure by Foreign Trade,* was published after his death in 1664. This work is the ablest of the writings of the mercantilists, and exercised great influence over the economic and political thought of the time, effectually refuting the Bullionist view, that only such foreign trade as yielded a direct balance of bullion was advantageous to the realm.

MUN'BY, Arthur Joseph (1828–1910). An English poet, born in Yorkshire. He graduated (1851) from Trinity College, Cambridge, and was called to the bar at Lincoln's Inn (1855). *Verses New and Old* (1865) contained "Doris," a lovely pastoral. *Dorothy* (1880), a country story in elegiac verse, was very popular in England and the United States. Later appeared: *Vulgar Verses* (1891), written in dialect; *Susan: A Poem of Degrees* (1893); *Poems* (1901); *Relicta* (1909). Munby defended his realism in an appendix to *Dorothy.*

MUNCH, mųnk, Edward (1863–). A Norwegian painter, born in Löiten. He was educated in Christiania and Paris under Bonnat. His "Early Morning" (1883), which attracted much attention among artists, "The Sick Child" (1885), "Spring" (1889), his best work, and "The Day Thereafter" (all in Christiania Gallery) reveal Munch as an able colorist. "Ashes," "Youth," "The Death in the Room," "Loving Woman," "Kiss," "Shriek," "Vampire," aroused much opposition by their pessimism. Munch's exhibition in Berlin (1892) caused a stir. His landscapes, "Summer Night," "Stars," "White Night," and his portraits, especially of himself and his sister, are notable examples of his work. An exhibitor abroad as well as at home, Munch came to be considered one of Norway's most important painters.

MUNCH, Peter Andreas (1810–63). A Norwegian historian. He was born in Christiania and educated there at the university. He became professor of history in Christiania in 1841 and in 1861 was appointed historiographer and archivist of Norway. He maintained that three distinct dialects prevailed in the kingdoms of Norway, Sweden, and Denmark, and that the so-called Icelandic literature was really the production of ancient Norway. He held that the modern Icelanders keep one dialect, and the inhabitants of the Faroe Islands another, of the ancient Norwegian. He rejected the term "Icelandic," for which he substituted "Old Norse." Among his works are: *Norges gamle Love indtil 1837* (3 vols., 1846–49), in collaboration with Keyser; *Det gothiske Sprogs Formläre* (1848); *Historisk-geografisk Beskrivelse over Kongeriget Norge i Middelalderen* (1849); a *History of the Norwegian People* (*Det norske Folks Historie*) (8 vols., 1852–63); *Om den saakaldte nyere historiske Skole i Norge* (1853). He edited a number of Icelandic works. His essays were edited by Gustav Storm (Christiania, 1872–76; 2d ed., 1894).

MUNCHAUSEN, mŭn-chô'zen, Baron. English for Münchhausen (q.v.).

MÜNCH-BELLINGHAUSEN, mųnk-bĕl'-ling-hou'zen, Eligius Franz Josef, Baron von (1806–71). An Austrian dramatist, known under the pseudonym Friedrich Halm. He was born at Cracow, studied jurisprudence, and held

a number of government offices in Austria. His first play, *Griseldis*, produced in 1834 (11th ed., 1896), was well received. It was followed by *Der Adept* (1836); *Camoens* (1837); *Imelda Lambertazzi* (1838); *Der Sohn der Wildnis* (1843; 10th ed., 1896), a conspicuous success on all the stages of Germany, and known on the American stage under the name of *Ingomar, the Barbarian*. In 1854 appeared *Der Fechter von Ravenna*, his greatest work, which was greeted with universal applause. Of all his subsequent efforts the romantic comedy *Wildfeuer* (1864; 7th ed., 1896) alone brought him a renewal of his earlier triumphs. He knew the stage and its requirements, but was not a great artist. His collected works were published in eight volumes in 1857–64. Consult: Pachler, "Die Jugend- und Lehrjahre Halms," in *Oesterreichisches Jahrbuch* (Vienna, 1877); Schachinger, *Briefwechsel zwischen Michael Enk von der Burg und Münch-Bellinghausen* (ib., 1890); *Allgemeine deutsche Biographie*, vol. xxii (Leipzig, 1885).

MÜNCHEN-GLADBACH, mün'ken-glät'bäg. A town in Prussia. See GLADBACH.

MÜNCHHAUSEN, münk'hou-zen, HIERONYMUS KARL FRIEDRICH, BARON (1720–97). An adventurous German noble, born on his father's estate, Bodenwerder, in Hanover, where he died. He served in the Russian cavalry against the Turks (1737–39) and told marvelous tales of his adventures. These were first gathered in English by Rudolph Erich Raspe (q.v.), a German exile (Oxford, 1785), as *Baron Münchhausen's Narrative of his Marvelous Travels and Campaigns in Russia*. G. A. Bürger rendered this into German (1786), and in that language it gained universal popularity as a monument of methodical lying unparalleled in literature. Consult Karl Müller-Fraureuth, *Die deutschen Lügendichtungen bis auf Münchhausen* (Halle, 1881), which shows that some of Raspe's tales are borrowed from Bebel's *Facetiæ* (1508) and others from Lange's *Deliciæ* (1765). Consult also Griesbach's introduction to a reprint of Bürger's translation (Stuttgart, 1890) and F. Lienhard, *Münchhausens Lustspiel* (Leipzig, 1900).

MUNCIE, mün'sĭ. A city and the county seat of Delaware Co., Ind., 54 miles northeast of Indianapolis, on the White River and on the Cleveland, Cincinnati, Chicago, and St. Louis, and Lake Erie and Western, the Chesapeake and Ohio of Indiana, the Fort Wayne, Cincinnati, and Louisville, the Pittsburgh, Cincinnati, Chicago, and St. Louis, and the Central Indiana railroads, being the terminus of the last mentioned, which has shops here (Map: Indiana, G 4). Intercommunication among the various lines is furnished by a belt road encircling the city. It is connected with Indianapolis and other cities by five interurban roads. It is the seat of the Muncie Normal Institute, and has a large public library, courthouse, and hospital. The city is situated in the natural-gas belt of the State near deposits of coal—advantages that have contributed to its development as an important industrial centre, noted particularly for its extensive iron, steel, and automobile interests. There are also large glass and fruit-jar works, canneries, and manufactories of lawn mowers, silver and silver-plate goods, underwear and clothing, handles, caskets, wheels and carriage woodwork, gas engines and supplies, steam boilers, iron bedsteads, etc. Pop., 1900, 20,942; 1910, 24,005; 1914, 24,969; 1920, 36,524.

MUNCK, mŭnk, ERNEST DE (1840–1915). A Belgian violoncellist, born at Brussels. He studied under his father, François de Munck, also noted as a violoncellist, and under Servais, and at 15 toured Great Britain with Jullien's orchestra. He played in Paris in 1868–69, at Weimar in 1870, at Leipzig in 1872, and at Vienna in 1877–78. In 1879 he married Carlotta Patti, a sister of Adelina Patti, and herself a soprano singer of ability. With his wife he made concert tours in the United States, India, China, Australia, and Egypt. In 1893 he was appointed professor of music at the Royal Academy of Music, London.

MUN'DA. An ancient town of Hispania in the country of the Turdetani in modern Andalusia. It is noted for the victory gained here by Cæsar over the sons of Pompey in 45 B.C. The exact location of the town is, however, a matter of dispute.

MUN'DAS, or MUNDA-KOLS. The inhabitants of Chota Nagpur and one of the principal tribes of the Kolarian stock in northeastern Hindustan. They are also known as Horo-hu. The Mundas are short of stature and very dolichocephalic. Monogamy is the rule, and the position of the wife is higher than with many Oriental peoples. Some writers use Munda as a general term for Kolarian. See KOLARIAN PEOPLES.

MUN'DAY, ANTHONY (1553–1633). An English poet, playwright, and compiler, born in London. In Rome he obtained material for *The Mirrour of Mutabilitie* (1579), a moralistic effort in verse, and after some experience on the English stage he wrote tracts against the Jesuits and other Roman Catholics, particularly Edmund Campion. Of 18 plays in which he had a hand only four are extant—*John a Kent and John a Cumber* (1595); *The Downfall of Robert Earle of Huntingdon* (1599); *The Death of Robert Earle of Huntingdon* (c.1601), with Chettle; *The True and Honourable History of the Life of Sir John Oldcastle* (1600), with others. Munday also translated French romances, wrote many "pageants," such as *The Triumphs of the Golden Fleece* (1623), and verse, such as *A Banquet of Daintie Conceyts* (1588). For bibliography of this prolific, if second-rate, man of letters, consult *Dictionary of National Biography*, vol. xxxix (London, 1894).

MUNDE, mŭn'dâ, PAUL FORTUNATUS (1846–1902). An American gynæcologist, born in Dresden, Germany. He came to the United States with his father after the revolution of 1848–49, and in 1866 graduated at Harvard Medical School, after serving as medical cadet in the Federal army in 1864. Volunteering as assistant surgeon in the war between Prussia and Austria, he was from 1866 to 1870 assistant in the hospitals at Würzburg, and in 1870–71 served as surgeon with the grade of first lieutenant in the Franco-Prussian War. Munde settled in New York City in 1872 as an obstetric specialist. In 1880 he became professor at Dartmouth Medical College, and in 1882 professor in the New York Polyclinic. He invented several gynæcological instruments, edited the *American Journal of Obstetrics* (1874–92), and wrote: *Minor Surgical Gynæcology* (1880; 2d ed., 1885); *A Sketch of the Management of Pregnancy, Parturition, and the Puerperal State, etc.* (1887); *Diseases of Women* (1891).

MUNDEL'LA, ANTHONY JOHN (1825–97). An English statesman and philanthropist, born at Leicester of Italian-Welsh descent. At 11

he was employed by a hosiery manufacturer; at 23 he was on the way to success as partner in a hosiery firm in Nottingham. Politically he was a Radical, sympathized with Chartism (q.v.), and manifested a deep concern for the suffering poor. He was instrumental in forming at Nottingham the first British board of conciliation for the settlement of differences between employers and employed (1866). Elected to Parliament for Sheffield (1868), he directed his energies towards the improvement of laws regulating factories and education, and was particularly successful in the lightening of women's and children's labor. In 1880–85 he was vice president of the Council of Education under Gladstone, and he succeeded in passing a compulsory-education act (1881), while as President of the Board of Trade (1886 and 1892) he started a labor department of which the *Labor Gazette* was the organ. In 1894–95 he was chairman of an important committee on poor-law schools, and worked to prevent the undue isolation of pauper children while being educated. He resigned from Parliament in 1894, but was reëlected the following year and died while in service.

MÜNDEN, mun'den. A town in the Province of Hanover, Prussia, situated at the confluence of the Fulda and the Werra, 11 miles northeast of Cassel (Map: Germany, C 3). It has a thirteenth-century Lutheran church, a Gymnasium, a royal school of forestry with a library of 9000 volumes, and a palace in which are relics of the faïence industry which once flourished in Münden. The chief manufactures are confectionery, hats, rubber, lead, celluloid, art objects, sugar, boilers, chemicals, and cigars. In the vicinity are coal mines and millstone quarries. Pop., 1900, 9236; 1910, 10,991.

MUN'DEN, Joseph Shepheed (1758–1832). An English comedian, now noted especially for Charles Lamb's encomium, "On the Acting of Munden." Born in London, he began life in a commercial position, but he early found a place on the provincial stage, and in 1790 made his appearance in London. His ability to "make faces" was famous, and he was greatest in broad farce, though in serious parts he was not without success. Among his best characters were Sir Francis Gripe, Sir Peter Teazle, Old Dornton, and Sir Robert Bramble. He retired in 1824, and died on Feb. 6, 1832, in London. Consult: Charles Lamb, *The Essays of Elia* (1st series, London, 1823); *Memoirs of Joseph Shepherd Munden, Comedian,* by his son (ib., 1844); Laurence Hutton, in *Actors and Actresses of Great Britain and the United States,* edited by Matthews and Hutton (New York, 1886).

MUNDT, munt, Klara. A German novelist, best known under her pseudonym Luise Mühlbach (q.v.).

MUNDT, Theodor (1808–61). A German novelist and critic of the "young German" school, husband of Luise Mühlbach. In 1848 he became professor of history at Breslau and in 1850 professor and university librarian at Berlin. He became first known by his *Madonna, oder Gespräche mit einer Heiligen,* a memorial of Charlotte Stieglitz. Mundt edited, with Varnhagen von Ense, Knebel's letters and posthumous works, and also published Luther's *Politische Schriften.* He wrote books of travel and romantically historical novels: *Carmela* (1844); *Mendoza* (1847); *Die Matadore, etc.* (1850); and also *Geschichte der Weltlitteratur; Geschichte der Litteratur der Gegenwart* (1842); *Geschichte der Gesellschaft;* and a critical *Kunst der deutschen Prosa* (1837). Consult Otto Draeger, *Theodor Mundt und seine Beziehungen zum jungen Deutschland* (Marbach, 1909), and H. H. Houben, *Jungdeutscher Sturm und Drang* (Leipzig, 1911).

MUNDURUCU, mōōn'dōō-rōō-kōō'. A powerful tribe of the great Tupian stock (q.v.), residing chiefly about the confluence of the Tapajos and Amazon in north-central Brazil. They are variously estimated at from 30,000 to 40,000. The men are tall, athletic, broad-chested, and of light complexion, and their naked bodies are entirely covered with artistic tattooing. The women are pleasing in manner, with a natural and unconscious vivacity. Both sexes are noted for their honesty. The men practice agriculture and do beautiful feather work. The women are skillful in weaving cotton fabrics and hammocks. Besides their habit of preserving the heads of their enemies, which has gained them the name of Paiguize (beheaders) among the surrounding tribes, they have the custom of killing persons hopelessly ill or decrepit.

MUNGER, mŭn'gẽr, Theodore Thornton (1830–1910). An American Congregational clergyman, born at Bainbridge, N. Y. After graduating from Yale College in 1851 and from the Yale Divinity School in 1855, he was pastor at Dorchester, Mass., until 1860, then spent two years in travel and study, and had charges at Haverhill and Lawrence. While in California in 1875–76 he established a church at San José. Afterward he was pastor at North Adams, Mass., until 1885, and from then till his death was connected with the United Church at New Haven, Conn., as pastor (1885–1900) and pastor emeritus. Dr. Munger was influential in the reconstruction of religious thought necessitated by science and criticism. He published: *On the Threshold* (1880; revised and enlarged ed., 1908); *The Freedom of Faith* (1883); *The Appeal to Life* (1887); *Horace Bushnell, Preacher and Theologian* (1899); *Essays for the Day* (1904). Consult B. W. Bacon, *Theodore Thornton Munger, New England Minister* (New Haven, 1913).

MUNGHIR, mŭn-gẽr'. A town of India. See Monghyr.

MUN'GO. See Shoddy.

MUNGO, Saint (?518–603). The popular name of St. Kentigern, one of the three great missionaries of the Christian faith in Scotland. St. Ninian (q.v.) converted the tribes of the south; St. Columba (q.v.) was the apostle of the west and the north; St. Kentigern was the apostle of the Strathclyde Britons, who held the country between the Clyde on the north and the farthest boundaries of Cumberland on the south. (See Strathclyde.) He is said to have been the son of a British prince and princess and is believed to have been born at Culross on the Forth, near Perth, in 518. He planted a monastery on the site of Glasgow and became the Bishop of the Kingdom of Cumbria (q.v.). The nation would seem to have been only partially converted, and about 553 persecution drove St. Kentigern from the realm. He found refuge among the kindred people of Wales, and there, upon the banks of another Clyde, he founded another monastery and bishopric, which still bears the name of his disciple, St. Asaph. Recalled to Glasgow in 573 by King Roderick the Bountiful, Kentigern renewed his episcopal and

missionary labors, in which he was cheered by a visit from St. Columba. He died Jan. 13, 603, and was buried where the cathedral of Glasgow, called St. Mungo's, now stands. There is a fragment of a *Life* of St. Kentigern written in the twelfth century, and a longer *Life* by Jocelyn of Furness, written about 1180, printed with translation in Pinkerton, *Lives of the Scottish Saints* (Paisley, 1889–95). Consult A. P. Forbes, in *The Historians of Scotland*, vol. v (Edinburgh, 1875).

MUNGO BEAN. See BEAN.

MUN'GOOS. One of the various spellings of mongoose (q.v.).

MUNG TSE. See MENCIUS.

MUN'HALL. A borough in Allegheny Co., Pa., on the Pennsylvania Railroad (Map: Pittsburgh, J 8). It contains a Carnegie library. The manufacture of steel products constitutes the borough's sole industry. Pop., 1910, 5185.

MUNICH, mū'nĭk (Ger. *München*). The capital of Bavaria and the third largest city in Germany, situated at an elevation of 1700 feet, mostly on the left bank of the Isar, on the south border of a partly swampy and partly fertile forested plateau, 296 miles by rail south of Leipzig (Map: Germany, D 4); lat. 48° 9′ N., long. 11° 35′ E. The city is only about 25 miles north of the Bavarian Alps and is subject to a somewhat raw climate characterized by abrupt changes of temperature, which are at times trying. Mean annual temperature, 46° F.

Munich is comparatively modern. It is progressive and handsomely equipped with the latest municipal improvements, having, in fact, been mostly built since about 1830. It owes its artistic and regal appearance to the art-loving Louis I and his successors. The very wide avenues and the many buildings constructed in all the leading styles of architecture lend great dignity to the metropolis. The streets are generally regular, and the city is lavishly adorned by numerous squares and pleasure parks and gardens. The largest park is the beautiful English Garden. It contains over 500 acres, watered by branches of the Isar and adorned with small temples, towers, etc., and was laid out by Count Rumford (q.v.), a native of Massachusetts, who lived in Munich from 1784 to 1799, and whose monument stands on the Promenadenplatz.

The old section of Munich, especially around the old canal and arms of the Isar, is very picturesque, with narrow streets and old houses. Improvements were made about 1800, 1830, and 1888. To the first period belong the Sonnenstrasse, Karlsplatz, Maximiliansplatz, Promenadenplatz, etc.,—streets which follow the old wall from the Sendlinger Gate, past the Karls Gate, to the Ludwigstrasse. The Ludwigstrasse, laid out in 1830, stretches from the Hall of Generals, an open loggia with statues of General Tilly and Prince Wrede, crossing the Odeons Platz with a statue of King Louis I, to the Gate of Victory, flanked with impressive Renaissance edifices (Library, Ludwigskirche, University, etc.), continuing as Leopoldstrasse to the suburb Schwabing. Other streets of this period are the Briennerstrasse from the gate of the court gardens, crossing the Karolinenplatz with the Obelisk, the Königsplatz with the exhibition building, the Glyptothek, and Propylæa, to the Stiglmayerplatz; and the Maximilianstrasse, running from the Max Joseph-Platz to the Isar, crossing the river on the Maximilian Bridge, and leading up to Maximilianeum; this street is lined by state and public buildings and ends in the Am Gasteig Park. The Am Gasteig Park and Maximilian Park border the Isar on the east side and contain the Friedensdenkmal in memory of the Peace of 1871 after the Franco-German War. To the Maximilian Park leads the Prinz-Regentenstrasse, belonging to the third period, running on the south side of the English Garden and crossing the Isar on the Luitpold Bridge. Eight bridges span the Isar.

The Max Joseph-Platz, together with the Marienplatz, represents the centre of life in Munich. The former connects the old and new sections and is embellished by Rauch's huge bronze statue of King Max Joseph. The Alte Residenz, one of the three parts of the royal palace, extends here along the Residenzstrasse with its open arcades and frescoes, especially the Italian landscapes by Rottmann. This structure was erected from 1598 to 1616 and contains four courts, but is of little architectural worth. Its apartments, however, are a source of great interest to sightseers, being luxuriously furnished in the seventeenth-century style and rich in historical associations. The royal chapel and the treasury possess numerous objects of intrinsic and historical value.

The other two parts of the palace are the fine Festsaalbau and the Königsbau. The latter, finished in 1835, and fashioned after the Pitti Palace, is notable for its splendid Nibelungen frescoes by Schnorr (1831). The former is a handsome edifice, completed 1842 in late Italian Renaissance style. It is enriched with Ionic pillars and with allegorical figures of the Bavarian provinces. Several apartments contain Hiltensperger's frescoes from the *Odyssey*. Beautiful salons are also the throne room, with striking bronze statues by Schwanthaler; the Rudolf von Hapsburg Hall, with paintings; the Barbarossa Hall, with reliefs by Schwanthaler; the Hall of Charlemagne, containing ambitious decorations descriptive of scenes from the Emperor's life; the "rich" rooms and chapel; the Pope's room (occupied in 1728 by Pius VI). But the best known of these apartments are those containing Stieler's 36 portraits of beautiful women, painted from various types of Bavaria's fairest womanhood.

Connected with these royal edifices are the great Hof und National Theater dating from 1823, with an attractive portico borne by Corinthian columns, and containing seats for 1800 persons, and the artistic and impressive court chapel, a structure dating from 1837, in the Byzantine Romanesque, and having sumptuous decorations. Adjacent also are a valuable ethnographical museum, an Art Union, with works of living artists, an instructive museum of plaster casts, and the museums of the Bavarian army in high Italian Renaissance. Other palaces in the city are the Old Castle or Ludwigsburg, the oldest palace of the Bavarian dukes, dating from 1253, the palace of the Archbishop, palace of Prince Charles, the palace of Prince Luitpold, the palace of Duke Max, with good decorations, and the royal Wittelsbach palace, begun in 1843.

Munich has no churches of great fame. The Ludwigskirche (by Gärtner, 1829–44) is a rather attractive example of Italian Renaissance, and contains a noteworthy "Last Judgment" by Cornelius. The St. Boniface basilica by Hübsch

MUNICH

LUDWIGSTRASSE, LOOKING TOWARDS GATE OF VICTORY (UPPER)
CENTRAL SECTION OF THE CITY, WITH THE NEW CITY HALL AND THE FRAUENKIRCHE (LOWER)

(1850), with some threescore gray-marble columns, is also worthy of mention, as are the Gothic Mariahilfkirche (1831–39) and Giesinger Church (1865–84), the Romanesque St. Annakirche (1892–94), and the St. Paulskirche (1895–1902). All these are modern churches. Of old churches may be mentioned the cathedral or Frauenkirche (1468–88), with two unfinished towers, the token of Munich, and the monument of the Emperor Louis (1314–47); the St. Peterskirche (1181), the oldest church of Munich; the St. Michael Hofkirche (1583–97), a fine Renaissance edifice, with the monument of Eugène Beauharnais by Thorvaldsen; and the Theatinerhofkirche (1663–75), Italian Baroque, with the mausoleum of the royal family. Of the four Protestant churches the Mathäuskirche, on the Sonnenstrasse, is the oldest, and near the Isar the St. Lukaskirche (finished 1897), Gothic-Romanesque. The synagogue (1883–85) is one of the largest and finest in Germany. Among the impressive secular buildings are the early Renaissance Mint; the Government Building; House of Parliament; War Office; Post Office; Palace of Justice; the Old Rathaus (1313–27); the Gothic New Rathaus, one of the finest and largest modern European municipal buildings, completed in 1906; the Martinus Hospital and the Red Cross Hospital; the Savings Bank; etc.

The picture and sculpture collections of Munich are famous. The building of the Old Pinakothek, situated in the northern section of the city, not far from the royal palace, was constructed in 1826–36, in the Renaissance style. It is about 174 yards long, and is embellished on the exterior by statues by Schwanthaler. It contains about 1400 canvases. Almost all the great masters of painting since Raphael's time are represented here by works of the highest excellence. The greatest gems perhaps are Dürer's Sts. Peter, John, Paul, and Mark (the "Four Temperaments") and his self portrait; several portraits and other pictures by Rubens, including the "Battle of the Amazons," the "Massacre of the Innocents," and the "Lion Hunt"; Perugino's "Virgin and St. Bernard"; Raphael's "Madonna Tempi"; and Murillo's "Two Beggar Boys Eating Fruit." The Old Pinakothek contains in addition valuable cabinets of vases; also engravings and drawings. Its loggie are decorated by Cornelius. Adjacent on the north is the New Pinakothek, with external frescoes by Kaulbach (q.v.), and with a good collection of modern artists, mostly Bavarian. There are about 1000 paintings, and many fine bronzes and terra cottas principally from Rome and Greece. In the vicinity is also the Glyptothek, containing mainly a collection of ancient statuary; a fine Ionic edifice by Von Klenze. It has Assyrian and Egyptian departments, as well as departments devoted to excellent Greek and Roman examples and to incunabula. The highly prized collection of marbles from the island of Ægina is also in the Glyptothek. Its most valuable sculpture perhaps is the Greek Barberini Faun (300 B.C.). Among the modern statuary are many originals, as well as copies from good artists, and choice works of Canova, Thorvaldsen, Dannecker, and others.

In connection with the realm of art in Munich may be mentioned the Kunstgewerbehaus; also the Academy of Art, an ambitious edifice in Italian Renaissance style, completed in 1885, a school which has produced many well-known artists. The artists of Munich maintain in the so-called Exhibition Building (finished in 1845) a permanent exhibition of their paintings exposed for sale. In the Crystal Palace (finished in 1854) are held the annual exhibitions of art, especially statues and paintings. The Club of Artists (finished in 1900) is celebrated for its interior decorations. The Bavarian National Museum, founded in 1855 and housed in a fine edifice, is of great value. Among its numerous collections covering many departments of human endeavor, the most valuable perhaps are the art works of the mediæval, Renaissance, and modern periods. The German Museum (1906–15), on the Museum Island in the Isar, contains a collection of originals and models illustrating the development of technical subjects and of natural sciences. On the same island is also to be found the Alpine Museum. The Schwanthaler Museum contains models of the master's works. A noteworthy picture collection also is the Schack Gallery, possessing choice originals and interesting copies of the great masters by many of Germany's foremost modern painters. Other museums are the collection of pictures and drawings left by the painter Kaulbach and the Lotzbeck Museum of pictures and marbles.

Munich is celebrated also as a musical centre, especially for German operas. The National Theatre is one of the most important of modern operatic institutions, being intimately identified with the Wagner influence and tradition. The theatre is well represented by about seven houses, besides the Court Theatre, among them being the Residence Theatre, the German Theatre, the Prince Regent Theatre, and the Gärtner Place Theatre.

Among the many monuments not already mentioned are those of the Emperor Louis the Bavarian, Louis I, Schiller, Goethe, Wagner, Glück, Schelling, Fraunhofer, Gärtner, Klenze, Ohm, and Pettenkofer; the large and striking monument to Maximilian II, dating from 1875; the fine statue of Elector Maximilian I, after plans by Thorvaldsen; an obelisk on the Königsplatz made of the metal of captured cannon, and erected to the memory of the 30,000 Bavarian soldiers who died in the Napoleonic war with Russia in 1812; the fine monument to Liebig, the chemist; the Mariensäule on the Marienplatz, erected by Maximilian I in 1638 in memory of the victory on the White Mountain (1620); near to the column the bronze Fischbrunnen, associated with the Butchers' Festivals; the new and splendid Wittelsbach fountain; the Nornenbrunnen. The Siegestor (gate of victory), constructed in 1843 in honor of the Bavarian army, is a splendid arch patterned after that of Constantine at Rome. It is surmounted by a huge figure of Bavaria, riding in a chariot drawn by four lions. On the Königsplatz, near the Glyptothek, rises the Propylæa, an attractive portal completed with Doric and Ionic features in 1862—a tribute to the cause of Greek independence. Notable also is the ancient Isartor, with elaborate frescoes. Still other objects worthy of visit in Munich are the bronze foundry and the Royal Arsenal, with an interesting military museum containing relics of the Napoleonic wars.

At the head of the educational institutions is the celebrated university. (See MUNICH, University of.) The city's educational system is scarcely surpassed either for comprehensive-

ness or for excellence. The Maximilianeum, on the right bank, is an institution founded by Maximilian II for advanced civil-service instruction. It is surrounded by attractive pleasure grounds extending along the river shore. The important Polytechnic School (1865–68) is in a fine modern edifice in Italian Renaissance, and had, in 1914, 65 teachers and 2790 students, divided into five departments—engineering, construction, mechanical, chemico-technical, and agricultural. Near by is an art industrial school. There are also in the city a military academy and a military school, an academy of science with noteworthy collections, and numerous organizations for the development of all the chief branches of knowledge and its application.

Of the many valuable libraries, the Royal Library is by far the most important. Its spacious Florentine building was constructed after 1832, and possesses a magnificent staircase. The library is one of the largest in the world. It contains some 1,100,000 volumes and over 50,000 manuscripts. It is especially rich in German documents and scholastic literature, possessing some of the rarest of literary editions and other specimens, including a translation of Boccaccio, a codex aureus (in gold letters and dating before 900), and four books of Gospels. In this library, also, are the archives of Bavaria—a collection of 500,000 documents. The city has a botanic garden.

Industrially, Munich is important and prosperous. Its iron, bronze, and bell foundries, its lithograph and engraving establishments, its optical and mechanical instrument factories, are celebrated, as are its enormous breweries (some 45 in number), which have made the city famous for excellent beer. The large, palatial brewhouses and, during summer, the celebrated "cellars," or beer gardens, in the suburbs, are features of the city's social life. Well known are the Hofbräuhäuser on the Platz in old Munich, the Löwenbraukeller, and the Augustinerkeller. The other manufactures comprise cotton, wool, and damask goods, wax cloth, leather, paper hangings, carriages, pianos, gold and silver articles, machinery, steel wares, etc. In its manufacturing and commercial interests the city has made great strides. Beer is the chief export. Grain, hops, coal, wool, furniture, carpets, and art goods also are exported. Munich has a network of canals over 100 miles in length. Numerous important industrial and commercial unions and associations are established here.

Munich is the seat of all the important government institutions of Bavaria. It is administered by 2 burgomasters, about 40 magistrates, and some 70 councilmen. The annual budget balances at approximately $4,500,000. The municipal debt is about $40,000,000, offset by nearly twice that amount invested in public property, mostly in buildings and grounds. Over a third of the taxes goes to the service and reduction of the debt. The charitable institutions are excellent.

The popular festivals and *dults* (fairs) are a feature of Munich. They are all elaborate and interesting—e.g., the annual carnival, the Magdalen Festival in July, and the October Festival. The last is a kind of agricultural fair which attracts the picturesque country population. The environs are of interest. Their unique attraction is the famous "Bavaria," an immense bronze statue by Von Klenze rising on a low elevation west of the city. It is a hollow female figure 94 feet high, cast from the bronze of foreign cannon, according to designs by Schwanthaler. It was unveiled in 1850. From its head there is a good view of the city. The adjacent Hall of Fame is a Greek colonnade dating from 1858. It holds about 100 busts of famous Bavarians, including Jean Paul and Schelling. The Nymphenburg is a royal château near the city. Its grounds are very attractive. The cemeteries of Munich are said to contain the most artistic tombs in the Empire. The population of the city has more than doubled in the last few decades. In 1800 it was 40,000; in 1871, 169,963; in 1900, 499,959; in 1910, 596,467; in 1915, about 630,000, mostly Roman Catholics. The death rate fell from 30.4 to 20.5 per 1000 from 1871 to 1904.

History. The history of Munich may be said to date from the time of Henry the Lion, who made it the centre of the salt trade in 1158. It grew rapidly under the house of Wittelsbach, which made it its capital city. The city was fortified in 1254, Otho the Illustrious having established his residence here. In the first half of the fourteenth century the library was founded. About the middle of the sixteenth century the art collections were begun. Munich became a royal residence in 1806. From the reign of Louis I dates the city's present magnificence.

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MUNICH, UNIVERSITY OF. One of the leading German universities, founded by Duke Ludwig of Bavaria with the approval of Pope Pius II as a Studium Generale at Ingolstadt. The members of the faculties took an oath of loyalty to the see of Rome. Though the bull authorizing the opening of the institution was issued in 1458, it was not opened until 1472. True to its pledge, Ingolstadt University remained faithful to the Church of Rome during the trying period of the Reformation, the famous Dr. Eck being a member of it at that period. In 1556 the Jesuits gained control of the university and conducted it until their suppression in 1773, though Ickstatt labored from 1746 to remove them. At the instance of Ludwig Maximilian, whose name the institution now bears, it was moved in 1800 to Landshut, where it remained until 1826, when it was transferred to Munich and reorganized. In addition to the collections and institutes brought thither from Landshut, the government transferred to the university the botanical garden, anatomical theatre, observatory, and antiquarium, and a valuable collection of coins. In 1913 the university consisted of the faculties of theology, law, political science, medicine, and philosophy, with a total attendance of 7718 students. The university also includes a number of seminars, clinics, museums, a botanical garden, and an observatory. The university library contains over 600,000 volumes, about 3000 incunabula, and about 2500 manuscripts. The Collegium Geor-

gianum, founded in 1494 for the education of Catholic priests, and the Maximilianeum, founded in 1852 and opened in 1876, for the education of talented Bavarian youth, are affiliated with the university. The income of the university is about $250,000 a year, the greater share being contributed by the government.

MUNICIPAL (mū-nĭs'ĭ-pal) **ARCHITECTURE** (Lat. *municipalis*, from *municeps*, citizen, from *munus*, duty + *capere*, to take). That branch of civil architecture which has to do with buildings erected out of public funds for the use and amusement of the inhabitants of a city or purely for the adornment of the city itself. The term is sometimes extended to include buildings for public business or amusement erected by private capital, such as exchanges, railway stations, and theatres. It is thus related on the one hand to the important concerns of civic administration and improvement, and on the other to those of architectural art. Its greatest development has been in modern times, coincidently with the progress in ideals of public policy and of democracy. It is doubtful if municipal buildings, properly speaking, existed in the prehistoric and the ancient Oriental worlds; the temple and royal palace filled all needs in these civilizations. The great city gates of ancient Babylonia and Assyria were the only structures in the Orient that could be included under the title of municipal buildings. See GATEWAY.

Greece. With the development of Greek city life after the seventh century B.C. several classes of such buildings were erected. Among these may be named the *Theatre* (q.v.), which was always erected with public funds, and which first began early in the fifth century B.C. to be built of stone and in the form and style recognized in the ruins of those at Epidaurus, Athens, Sicyon, etc. The *Stadium* (q.v.) and the *Hippodrome* (q.v.), for the different kinds of races, gave little opportunity for much distinctive architecture. The *Gymnasium* and *Palæstra* were devoted to contests requiring less space and to training and practice, and embodied features developed later by the Romans in the Imperial thermæ. Those at Ephesus and Alexandria-Troas are especially well preserved. The commercial centre of the city was the market place, or agora, corresponding to the Roman Forum (q.v.), an open rectangular space bordered by colonnades and halls and decorated with monumental entrances, statuary, and fountains. The various halls for the transaction of municipal business, such as the *Prytaneum* and the *Bouleuterion*, were often connected with the market place, and there were frequently two agoræ in each city—the political and the commercial. Those at Priene, Assos, and other cities of Asia Minor are particularly important, as no well-preserved examples have been found in Greece itself. The so-called *leschai* were public halls for banquets and other reunions and celebrations. Of the highest importance were the *propylæa*, or city gates, of which the most famous are those of the Acropolis at Athens and of Eleusis and Priene. To the list of Greek municipal buildings should be added the *stoæ*, or open colonnades, and such decorative and memorial structures as the choragic monument of Lysicrates and the Tower of the Winds at Athens, public fountains, and the like. See PROPYLÆA; STOA.

Rome. The Romans developed municipal architecture even further in magnificence and variety after the second century B.C. Their theatres were more important structurally and richer in decoration; their amphitheatres were a new form altogether; their circus was architecturally more significant than the stadium and hippodrome. The Roman Forum, which was at first an irregular square without architectural beauty, was later bordered by basilicas, great halls for commercial and judicial purposes, while memorial and triumphal arches were placed at its entrances and along its main road. In the early days of the Empire a new type of city was developed, in which the various main groups of public buildings were united and harmonized by vast stretches of porticoes. Such porticoes in Rome itself were the Porticus Maximæ, extending to the Tiber, and the mile-long Porticus Triumphi in the Field of Mars. In the cities of Syria and the rest of western Asia a great era of rebuilding set in, the old blank-walled main streets being replaced by colonnaded avenues decorated with statues and intersecting at right angles. This type, which originated at Antioch, can now best be studied at Palmyra, Gerasa, and other cities near the coast line.

The many new Roman colonies and municipalities in north Africa and Syria gave even more occasion than the old cities for the carrying out of a regular plan of municipal architecture. The cities of Theveste and Timgad are important examples. The Pompeian Forum with its well-preserved basilica, its curiæ or municipal meeting halls with their colonnades, its Temple of Jupiter flanked by memorial arches, its Pantheon with the money changers' shops, its market hall, Temple of Venus, lounging gallery, and other well-grouped structures, shows how the government of a provincial town of moderate size grouped the public buildings around its main square.

Of the theatres, those at Aspendos in Asia Minor and Orange in France are the best preserved; of the amphitheatres, those of Rome (the Coliseum), Verona, Capua, Arles, Nîmes, and Thysdrus; of the basilicas, those of Maxentius in Rome, of Pompeii, and of Treves.

With the decline of Roman power and the transfer of the capital to Byzantium the focus of activity in municipal architecture was shifted and Constantinople, or New Rome, became the scene of an extraordinary work of reconstruction under Constantine, Theodosius, and (later) Justinian. Meanwhile, until the final overthrow of the older capital, public buildings, porticoes, and basilicas were still being erected in Rome, and the majestic ruins of the Basilica of Maxentius and Constantine attest the importance of these expiring efforts of Roman art.

Middle Ages. The growth of municipal architecture in the Middle Ages was very gradual and depended largely upon the character of city government. In the monastic and feudal cities there were no works of municipal architecture of any importance. Conditions were more favorable to the erection of municipal buildings in the free communes and episcopal cities, which possessed complete or partial autonomy.

The most important municipal buildings were the hôtel de ville in France, the Rathaus in Germany, and the palazzo pubblico or communale in Italy. The cities of northern and central Italy, of northern France and the Netherlands,

of northern Germany (especially the Hanseatic League), were most conspicuous for such buildings during the Romanesque and Gothic periods. The plan of the communal palaces varied according to whether the local constitution provided for meetings of a large body of citizens or only of a select few inside the building. The Doge's Palace in Venice had halls for the Gran Consiglio and others for the Council of Ten and the smaller council. At the more democratic Padua the immense hall with its wagon roof—the largest in Europe—provided for larger meetings. At Udine and Piacenza are the best examples of a whole lower story open in vaulted arcades for the popular meetings, with halls on the second floor for the smaller committees. These palaces in Lombardy were usually termed *broletti* (Como, Bergamo, Cremona, Monza, etc.). The main meeting room on the second floor was nearly always provided with a balcony or *ringhiera*, from which announcements were made to the people.

The cities of Tuscany and Umbria, later in achieving independence (except Pisa), erected, however, even more magnificent public palaces than their northern neighbors. The Palazzo Vecchio and Bargello in Florence, the Palazzi Pubblici at Siena and Perugia, built during the Gothic period (1250–1350), are the largest in Italy and especially remarkable for magnificent towers. Hardly a city in Italy, even one enjoying but a modicum of administrative autonomy, but had a public palace of some sort, and in some cities there were two palaces, the episcopal and the civil.

Such communal palaces were much rarer in feudal France; they are almost wholly wanting in the southern and central provinces. But the powerful cities of the Netherlands—Lille, Louvain, Mechlin, Brussels, Ghent, Bruges, Ypres, Arras, and Liége—built as magnificent public palaces as their Tuscan compeers. That of Brussels, with its great central tower, is a fine example in the developed Gothic style; that of Louvain presses it closely in magnificence. Germany is particularly rich in such buildings, not on so large a scale, certainly, but interesting from their very number. In France the hôtels de ville of St. Antonin (thirteenth century) and of Compiègne (fifteenth century) are among the few mediæval buildings of this class. Municipal belfries (see BELFRY), or *campanili*, were prominent in many cities of both northern Europe and Italy. The *palais de justice* of France were important civic monuments, as those of Paris and Rouen, the Prévôté at Poitiers, etc.

The communal organization in the cities was usually based upon the association of the labor and trade guilds. It was the officers of these guilds who, coming together for mutual benefit, originated in most cases the city administration and constitution. Many of these guilds had separate buildings for their meetings and they usually repeated on a smaller scale the architectural features of the communal palaces. The Loggia dei Mercanti at Bologna, those at Ancona and Perugia, the Or San Michele at Florence, are a few among many. The lawyers' guild sometimes built sumptuously, as in the Palazzo dei Giureconsulti at Cremona. In the case of some of the very powerful Flemish guilds, such as the cloth guild, their buildings equaled or surpassed the average town hall; this was the case at Ypres (recently destroyed). In some cases the governing body had a palace separate from that where the popular meetings were held. Thus, at Pistoia there was a Palazzo del Comune and also a Palazzo del Podestà. Other associations besides the guilds erected common halls—the religious fraternities, such as that which built the Bigallo in Florence or the various beautiful *scuole* in Venice. Hospitals like those of Ourscamp and Beaune in France, the Hospital at Milan, and the Misericordia at Arezzo, are distinctly public monuments.

The most important of the minor works of municipal architecture were the bridges, fountains, and gates. The first two classes have been treated under their separate heads, so that it will be necessary to describe only the city gates. During the Middle Ages the fortification of cities by heavy walls was a universal custom and the gates were fully as important as the triumphal arches and gateways of Roman cities. The great gates at Lübeck, Frankfort, and Freiburg, and several gates at Florence, show the German and Italian styles. They were usually dedicated to a saint and contained a shrine and frescoes or carved images in the central opening; guardrooms on the sides and above contributed to making the gate a monumental structure. The round or pointed single archway was often flanked by two towers, as in the Porta della Vacca at Genoa.

In so far as the general arrangement of the larger mediæval cities is concerned, the cathedral square was the main centre of the city, the market place, and a place of resort; but wherever there was also a strong municipal civic organization there was also a second square dominated by one or more city buildings and kept free for public assemblies. Seldom do we find a single square used for both classes of buildings.

Mohammedan. There was far more of municipal architecture in the mediæval Mohammedan cities of the Orient than Europeans realize. The bazars with their long covered galleries rivaled the gallery arcades of modern cities; the khans and caravanserais with their immense courts were often on a colossal scale. Numberless sebils or fountains were dotted through the streets. The city gates were monumental. The alcazars were an interesting combination of governmental palace and fortress. There were numerous hospitals and colleges with attached mosques and mausoleums, as at Ispahan. Few European cities showed so ample a display as Bagdad, Cairo, Damascus, Adrianople, Constantinople, or even the mediæval cities of second rank, like Fez, Kairwan, Emesa, and a hundred more. The Mohammedan engineers in western Asia were famous for their bridges, fortifications, and castles. The great wealth and advanced culture of the Arabs, Moors, and Persians, and of the Moslem Hindus—far superior to that of the West in the Middle Ages—made it easy to build up beautiful cities, now all reduced to squalor and ruin.

Renaissance. While the Renaissance was more fruitful in works of private and religious architecture than in municipal architecture, a great number of notable buildings were erected for public purposes in the cities of Italy and of western Europe. The general downfall of civic liberties checked the progress of some phases of municipal architecture, but the change of style ushered in by the Renaissance led to the erection of many new edifices in the more modern

style. Thus, in Italy the elegant town hall at Verona (Palazzo del Consiglio), by Fra Giocondo (1470), the town hall at Padua, the Loggia del Papa at Siena, the Procurazie Vecchie at Venice, belong to the fifteenth century; to the sixteenth, the Library of St. Mark and the Loggetta of the Campanile (demolished by the fall of the tower, 1902, but since rebuilt) at Venice, the magnificent arcade surrounding the ancient Basilica at Vicenza, by Palladio, and many loggias and administrative palaces in other cities. The Hôtel de Ville at Paris (1546), the town halls of Rheims, Rouen, and other French cities, and even of small towns like Beaugency, erected in the sixteenth century, the great town halls of Antwerp and of several Dutch cities, and the picturesque Rathäuser, or council halls, of Bremen, Nuremberg, Altenburg, Cologne, and other German cities, prove that there was still opportunity for effective and beautiful municipal buildings. Fountains were also multiplied, often of great elaboration and sculptural splendor. (See FOUNTAIN.) In the seventeenth and early eighteenth centuries there developed a remarkable movement for the embellishment of cities by the decorative treatment of open squares and spaces. Of this movement the piazza in front of St. Peter's, with its colonnades, obelisk, and fountain, and the Piazza del Popolo, both at Rome, and the Place de la Concorde and Place Vendôme at Paris, are the finest examples. It was in the eighteenth century that a new era of municipal architecture commenced in Germany with the transformation of Berlin under Frederick the Great, followed by that of Munich in the first half of the nineteenth century, and then by that of Vienna, and that of Paris by Baron Haussmann under Napoleon III. New classes of buildings were developed and erected —museums, picture and sculpture galleries, halls of fame, theatres, and public educational buildings. Every style of architecture was employed, but mainly the neo-classic and neo-Renaissance. The triumphal arch again came into vogue. Great boulevards became the fashion. The old-fashioned narrow streets were discredited, even in Italy. The sun was let in everywhere. The increasing volume of transportation compelled the multiplying of bridges, the rectification of the street plan, and the construction of railway tunnels, cuttings, and viaducts, the building of docks and terminals, and many other like improvements.

Recent Development.—Europe. Of the more recent development of municipal architecture Paris, Vienna, and Budapest stand out as the most conspicuous examples; but Berlin, Munich, and other German cities, Rome and Naples, and in less degree many other cities in Europe, have undergone a process of architectural remodeling. The great operations undertaken by Napoleon III in Paris under Haussmann's direction included not only the reform of the city's street plan, but also the erection of many public buildings. This work, interrupted by the fall of the Empire, was resumed under the Republic, and has been steadily prosecuted ever since, at the joint expense of the city and state. The new Opera House, the reconstructed Palais de Justice, the Tribunal de Commerce, the completed and remodeled Louvre, the St. Michel Fountain, and since the War of 1870–71 the new Hôtel de Ville, Sorbonne (university), and Ecole de Médecine, the demolition of the ruined Tuileries and creation of new gardens on its site, the two new art palaces, and the Alexander III and other bridges, are the monuments of this remarkable activity. So the Reichstagsgebäude (parliament house), the Museum, the various columns of victory and other monuments, and the Sieges-Allee, at Berlin, the squares and modern public buildings of Munich, the town hall and new railway terminal at Hamburg, the town hall at Leipzig, and many other examples indicate the tendencies of German taste in municipal buildings and embellishments. Germany at present leads the world in city planning, whatever be thought of the artistic quality of many of her municipal buildings; while in Austria-Hungary the marvelous rebuilding of the central portion of Vienna and the more recent architectural enterprises in Budapest are equaled only by the transformation of Paris under Napoleon III. While the architectural treatment of the Viennese public buildings (the Gothic town hall, the classic parliament house, the Renaissance university, museums, art institute, the Hoftheater, etc.) leaves something to be desired, the general effect is highly impressive by its stateliness and grandeur of disposition along a single splendid street, the Ringstrasse. In Great Britain nearly every important city has in recent years either rebuilt portions of its more overcrowded districts on improved plans, or erected new town halls, exchanges, public baths, schools, and museums; and the English architects have developed in these public works an architectural style of considerable interest and character, quite different from the modified French Renaissance style which has more generally prevailed elsewhere. Italy, though backward in many respects in this field of architecture, has not only remodeled some of the worst-crowded districts of Naples and Rome, but has embellished many of her cities with public buildings in modern style, established new parks and public gardens, and in some cases completed the unfinished façades of ancient buildings—notably that of the cathedral of Florence (1883–89). The embanking of the Tiber (1879–1900) in Rome, the construction of new bridges, the building of arcades or glass-roofed streets of monumental design, flanked by attractive shops (as at Milan, Naples, etc.), and the erection of railway termini sometimes of considerable architectural splendor, are further evidences of municipal activity.

United States. While the first 50 years of independent national existence witnessed the erection of many noteworthy Federal and municipal buildings, especially customhouses and State capitols, these were often indifferently placed, with no adequate approach or surroundings. The public buildings of American cities—town halls, railway stations, schools, courthouses, and administrative offices—were for the most part commonplace, or pretentious and ugly. Only rarely, as at Washington, New York, Savannah, and Charleston, was there until recent years even the semblance of any recognition of the art of municipal planning or of the importance of artistic treatment alike in the design and setting of public buildings. The rectangular street plan was universally accepted as the ideal arrangement. Of late, with the general awakening of the art instinct in the United States, stimulated by the object lessons afforded by several great expositions (Chicago, Omaha, Buffalo, St. Louis) and by congresses and con-

ventions of architects and civic reformers, there has begun a widespread reform in municipal architecture, of which the commission plan for the improvement of Washington, the adoption of the group system for the public buildings of Cleveland, Ohio, the new park system of Boston, and the proposed remodeling of the Chicago lake front, are a few out of many evidences. Recent town halls, exchanges, public libraries, courthouses, and railway stations in the United States are excellent structures architecturally. Particularly noticeable are new public libraries at New York, Detroit, St. Louis, and Springfield (Mass.); the new municipal group of this last-named city, the city hall at Los Angeles (Cal.), and the superb new municipal offices at New York; the colossal railway termini of New York and its great bridges across the East River, its new docks and ferry terminals; and an impressive number of courthouses, customhouses, terminals, squares, bridges, monuments, school buildings, municipal hospitals, and the like in nearly all the larger and some of the smaller cities, which give promise that the ugliness of American cities is to be greatly mitigated if not done away with in the near future. See TOWN HALL, and Plates of PHILADELPHIA.

MUNICIPAL ART SOCIETIES. Societies in the United States which take their name from the purpose of their organization, which is the promotion of municipal art, i.e., art as applied to cities. They seek in a general way to beautify cities. Among the means advocated to this end are the planning of cities with regard to artistic beauty as well as to the needs of traffic; the planting of streets with trees and the restriction of billboard advertising; the increase in the number and size of parks, especially in the congested districts; worthy sites and beautiful architecture for public buildings, and their decoration with statuary and mural painting; the embellishment of the city with statues, monuments, and other works of art—things which have long been esteemed essential in European cities. In the United States these ideals are promoted by local societies, like the municipal art societies of New York, Chicago, Baltimore, Cincinnati, and other cities, the Fairmount Park Association of Philadelphia, and the American Park and Outdoor Association. Among the achievements of the movement have been the official appointment of municipal art commissions, composed principally of artists, by New York, Chicago, and other cities, with general supervision over public buildings, monuments, and other artistic undertakings; enactment of legislation, both State and local, designed to regulate billboards in Chicago and elsewhere; appointment of commissions of experts to devise comprehensive plans for the growth of Washington (1901) and similar proposals for New York (1903). Two volumes of *Municipal Affairs* are given to the movement, vol. ii and iii (New York, 1898–99). Consult also C. M. Robinson, *The Improvement of Towns and Cities* (ib., 1900; 8th ed., rev., 1913); id., *Modern Civic Art* (ib., 1903); T. H. Mawson, *Civic Art* (London, 1911).

MUNICIPAL CORPORATION. See MUNICIPALITY.

MUNICIPAL DEBTS. In a strict sense of the word, debts incurred by municipalities. When, however, the total municipal indebtedness of a country is being discussed, particularly in comparison with state or national debts, the indebtedness of all minor civil divisions is generally included. Municipal debts are divided into bonded (or funded) and floating, and the latter may be divided still further into temporary loans in anticipation of revenue and obligations due for material furnished or services rendered. Bonded indebtedness, as a rule, so far exceeds floating indebtedness that the latter is frequently ignored in ordinary discussions.

History, Objects, and Methods. The development of municipal debt is for the most part coincident with the expansion of municipal functions, an expansion which began with the nineteenth century and was particularly active during the decades between 1850 and 1870. A factor which contributed largely to the growth of American municipal debts was the aid given to railway enterprises. Many municipalities so burdened themselves with debt for the sake of assisting in the construction of railways through their limits, that for many years they were obliged to forego the most essential public improvements. Such railway aid was granted by rural as well as by urban communities.

Railway assistance aside, the chief objects for which urban communities issue bonds are the opening and paving of streets, the construction of water works, sewers, bridges, schoolhouses, and other public buildings, and lighting. Counties, in some sections, issue bonds for bridges and for highway improvements. Finally, school districts, chiefly those located in rural sections, issue bonds to raise money to construct schoolhouses. Obviously, floating debts and loans in anticipation of taxes may have their origin in almost any of the various needs of the municipality. Loans in anticipation of revenues are usually raised on notes or tax certificates. Obligations for material and for labor or other personal services, or for amounts due on contracts, are frequently acknowledged by warrants on the general treasury or on some special fund, and such warrants become negotiable paper. When the cost of specifically local improvements, like paving or sewers, is met by special assessments on the property directly benefited, and the collections are delayed or distributed over a series of years, the obligations are met in a variety of ways, ranging from warrants to short-term bonds. In negotiating municipal loans bonds are commonly sold, after public advertisement, to the highest bidder. Temporary loans on notes are commonly effected at banks.

The financial principles involved in a consideration of municipal debts are in most respects similar to those already set forth under DEBT, PUBLIC; FINANCE. Municipal bonds are issued for definite periods, and the best and common practice is to provide in advance for their payment at maturity. Formerly such provision was made through sinking funds, but for a number of years past there has been a growing tendency to pay off municipal bonds in installments. This plan obviates the necessity of administering a number of special and rapidly accumulating funds, which sometimes present financial difficulties and are always subject to diversion on the part of unscrupulous or ill-advised municipal officials.

In fixing the term for which municipal bonds are to run it should be borne in mind that, since municipal bonds are issued to distribute the expense of certain improvements over a number of years, the term of the bonds issued should bear

some relation to the probable life of the improvement involved. Street pavements, e.g., require renewal in from 10 to 20 years; it would therefore be a gross mistake to make bonds issued to cover their cost run 40 or 50 years. Land purchases, on the other hand, involve a class of property that appreciates rather than depreciates as time goes on; it might accordingly be permissible to pay for them by an issue of long-term bonds.

The interest rates on municipal bonds have fallen from 6 and 7 per cent a few decades ago to 3½ and 4 per cent as a normal figure for the bonds of municipalities of good standing. The premiums generally received virtually lower the interest rate, often to a considerable extent.

Debt Limitations. The interests of borrower and lender combine to make necessary some limit to the amount of indebtedness which a municipality may incur and the purposes for which money may be borrowed. Considering the latter first, it is obvious that permanent loans should never be made to meet current expenses, although occasionally it may be necessary or wise to fund a floating debt that, through bad financiering, has grown beyond ordinary revenues. Public loans to aid private enterprises are generally held to be against public policy, and are unconstitutional in some states. As to the amount of indebtedness which a municipality may incur, prudence demands that this be kept so low as not to overburden the taxpayer with interest and other capital charges, or, in the case of productive undertakings, the patrons thereof. Even where there are no constitutional, statutory, or charter limits on indebtedness and taxation, there is a practical limit to the burden of taxation which the citizen will bear. But most municipalities are subjected to definite limitations as to debt and taxation. Such limits vary widely in different countries and states, and even among the cities of a single state. It is generally some percentage of the assessed valuation, but as the relation of this to the actual value of the property assessed varies widely, comparative debt limits are likely to be very misleading unless supplemented by explanatory statements. In general, it may be said for the United States that the legal debt limit ranges from 3 to 10 per cent of the total assessed valuation, although some cities are subject to no legal limitations in this respect. Where the limit is by statute instead of constitution, appeals for its extension or for exemptions on account of certain classes are frequently made to the Legislature. Waterworks bonds are quite often exempted from computations of the debt limit, and recently there have been efforts in several States to exclude from the debt limit all bonds issued for revenue-producing works. In Great Britain some classes of loans are subject to the sanction of Parliament, and the control of other classes has been deputed by Parliament to the Local Government Board. This body has a well-organized staff of experts; it gives formal local hearings on applications for specific loans and grants or withholds its consent to the applications. On the continent of Europe there is some central control of debts in at least Prussia and France. The nearest approach to central control of loans in the United States is found in Massachusetts, but its exercise is due primarily to sanitary rather than financial safeguards. Legislative permission to make water-supply and sewerage improvements is seldom if ever granted in Massachusetts unless the plans for the proposed work are approved by the State Board of Health.

Statistics. Reliable comparative figures of municipal indebtedness are even more difficult to obtain than a comparative summary of debt limitations. The debts of individual cities, especially when reduced to a per capita basis, can be interpreted intelligently only when accompanied by statements regarding tax rates, the extent to which the cost of municipal improvements is met by special assessments, and especially by data as to the character and extent of the services rendered to the citizens by the municipality. Low per capita bonded indebtedness is not necessarily advantageous to citizens and taxpayers, since it may mean that the city in question is either without improvements or that its water works, lighting service, bridges, and even sewers are owned by private companies.

For the United States local-debt statistics by cities, States, and for the whole country were given in the tenth and eleventh censuses (1880 and 1890). From 1899 to 1901 the United States Department of Labor devoted a large part of its September Bulletin, each year, to "Statistics of Cities," among which it included bonded, floating, total, net, and per capita net debts, and sinking funds, for cities of 30,000 population and upward. The corresponding statistics, after 1901, have been published from time to time as bulletins of the Census Bureau.

According to the report of the Bureau of the Census on *Statistics of Cities in 1912*, the aggregate net indebtedness of cities having a population of 30,000 and above was $2,015,600,020, or $68.74 per capita. The per capita indebtedness varies directly with the magnitude of the city, as the following table shows:

CLASSIFICATION	Total net debt	Per capita
Cities with population over 500,000	$1,204,136,742	$95.50
Cities with population of 300,000–500,000	246,779,829	71.88
Cities with population of 100,000–300,000	270,048,931	44.61
Cities with population of 50,000–100,000	174,261,665	42.85
Cities with population of 20,000–50,000	120,372,855	38.12

New York had a net indebtedness of $792,927,021 and a per capita debt of $156.57. The lowest per capita debt among cities above 500,000 was that of Detroit, $18.09. The city of Denver had the lowest per capita indebtedness of all the cities for which statistics are given—$3.82.

Comparative figures of municipal indebtedness throw practically no light upon the problem of relative economy and efficiency. In general, the cities that are extensively engaged in productive undertakings show a large per capita indebtedness. The increase in per capita debt with increase in the size of cities is to be explained by the fact that the larger the city the greater the number of collective enterprises the city is forced to undertake.

Bibliography. Adams, *Public Debts* (New York, 1890); J. A. Fairlie, *Municipal Administration* (ib., 1908); the works noted under DEBT, PUBLIC, and FINANCE; United States Census Reports (Washington); also Bulletins on Social Statistics of cities for years since 1901; United States Department of Labor, Bulletins (ib., 1899

et seq.); British Local Government Board Reports; and the semiannual "States and City Supplement" to the *Commercial and Financial Chronicle* (New York).

MUNICIPAL FIRE PROTECTION. See FIRE PROTECTION, MUNICIPAL.

MUNICIPAL GOVERNMENT. The administration of the affairs of a city, town, borough, village, or other minor civil division of a state, but generally restricted to the government of pure municipal corporations as opposed to quasi-municipal corporations, such as counties, townships, and school districts. Municipal government seldom reaches its fullest development outside of the larger cities, but numerous municipal activities are often undertaken in progressive urban communities of only a few thousand inhabitants. Since the municipality is the creature of the state, it follows that its form of government, its various activities, and its powers are not only derived from the state, but are also subject to alteration or repeal at its will. The municipality has a direct and far more intimate relation with those who are subject to its government than does the state, supplying many wants common to its inhabitants and performing or supervising the performance of many services which outside of the municipality are left to private enterprise.

In some of these respects, as in the exercise of the police power, the care of the public health, the administration of charity, and the administration of local justice, the municipality is actually the agent of the state and discharges duties of interest to the state at large; in others, as in the furnishing of water or light, the state permits the community as a whole to act as a local organization for the satisfaction of purely local needs of interest to the community only. The very remarkable growth of the urban population during the last half century has greatly increased the importance of municipal government and at the same time multiplied its difficulties. For the origin and nature of the legal powers of municipalities, see MUNICIPALITY; see also the general article GOVERNMENT. For the history, growth in population, and certain economic, social, and political phases, see CITY.

Municipal government may be considered under four main heads: (1) functions; (2) organization; (3) finance; (4) public policy.

Municipal Functions. The functions of a municipality include all the public activities of the city, whether direct, such as laying out and maintaining streets, or indirect, such as regulating traffic and maintaining order on the public thoroughfares. These activities are many and complex and frequently overlap, but they may be grouped as follows: (1) the so-called public utilities, which include ways and means of communication and transportation, together with the supply of light and water to the inhabitants; (2) disposal of wastes; (3) protection of life, health, and property; (4) charities and correction; (5) education; (6) recreation; (7) municipal housing. The provision of *ways and means of communication and transportation* is one of the first and most obvious functions of municipal government. Its basis is the public streets, upon the surface of which all land traffic moves, beneath which are placed pipes to bring in municipal supplies and to carry out wastes, and either above or below which are wires for transmitting messages. As an aid to the movement of street traffic, it falls within the duties of the municipal government either to provide street railways or to see that they are provided and properly operated by private enterprise. In many of the English and Scottish cities the street railways have been constructed and are owned by the municipality, or have been acquired by purchase; they are sometimes leased to a private company for operation. In the United States this is usually a function of private enterprise, subject to the supervision of the city. Where waterways are involved, bridges and perhaps ferries must be provided, and frequently docks, wharves, and harbors as well. Bridges are now almost always built and maintained at public expense. Municipal docks are far more common than municipal harbors. Where docks are required, they often are or may be an important source of revenue; but the first consideration should be to afford every facility for the speedy and cheap handling of goods and passengers. The relation of municipal government to the telephone and telegraph service is chiefly regulative, especially in the United States, and thus far extends but little beyond the police control of the electric wires involved.

One of the most important municipal services is the supply of water for household and industrial purposes, for fire protection, and for sewer and street flushing. The lighting service, like the water supply, is for both public and private use. The light furnished may be either in the form of gas or electricity. Almost everywhere at present the water and lighting supplies are municipal functions, although they may be intrusted to private companies. Municipal markets for the sale of meat and other food supplies are frequently maintained for the sake of both convenience and sanitation. The sanitary aspects of cattle markets, abattoirs, and slaughterhouses are of great importance. Consequently, where markets are not provided, the municipal health authorities exercise, or should exercise, a rigid supervision over private markets and also over the various foods prepared or exposed for sale therein. The supply of such articles as milk and ice to the inhabitants is left to private enterprise, but on sanitary grounds is usually subject to regulation. Infant milk depots are being maintained by an increasing number of cities at home and abroad.

Wastes.—By far the greater part of the large quantity of water supplied to the modern municipality must be removed again in a more or less befouled condition. All American, many British, and the largest continental cities have found water to be the best vehicle for removing excreta, and as a result we have the modern sewerage system, which carries away this dangerous waste together with the water otherwise befouled by domestic use. The surface drainage from roofs, yards, and streets may be removed with the sewage or else in separate conduits. The food wastes of the kitchen and table, consisting of decomposable organic matter, and commonly known as garbage, require collection and disposal (see GARBAGE AND REFUSE); and the same is true of ashes, waste paper, and other rubbish. Street dirt must be collected and removed, and the streets must be sprinkled to keep down the dust which is inevitable even with the best sweeping. All these are municipal functions which cannot be left to private enterprise. Finally, the human dead must be considered under the general head of wastes, and cemeteries must be provided for burying or cre-

matories for burning the bodies. Cemeteries are frequently, but crematories rarely, owned by municipalities. The other services included under the heading "wastes," in so far as they are performed with regularity and system, are almost invariably rendered by the municipality, either directly or by contractors at its expense and under its supervision.

Protection of Life, Health, and Property.— The protective functions of a municipal character include the work of the police, the courts, the fire department, and the board of health, together with the building-inspection service and the provision of public baths, washhouses, and water-closets. *The charities and correction service* includes poor relief and the maintenance of asylums and reformatories. *The educational service* embraces not only the work of the common schools preparatory to the college, but also manual training, and sometimes technical education, night schools, vacation schools, libraries, and museums. The municipality in undertaking the work of elementary education and poor relief is acting as the agent of the state, and is subject to more or less central control so far as these activities are concerned. *The recreation service* includes the establishment and maintenance of parks, playgrounds, gymnasiums, together with the provision for public concerts and lectures. The three first named institutions might also be included under both education and health service, while concerts and lectures may be included under education as well as recreation. *Municipal housing* is practically unknown in America, but is a marked feature of municipal activity in Great Britain. It has arisen partly through the demolition of whole blocks of unsanitary houses, which seemed to make necessary a provision for rehousing the ejected tenants, and partly from a desire to afford municipal aid in the efforts being made by philanthropists to improve the home condition of the working classes. The houses built at municipal expense are generally designed to provide living places thoroughly sanitary in their construction and appointments for the poorest class of self-supporting wage earners.

Organization. The successful administration of the many and varied activities just outlined demands a degree and character of organization resembling in some respects that of a large private corporation. In the government of states it is common to divide the functions of government as well as the officials who discharge them into three groups—the legislative, the executive, and the judicial. The same general plan might be followed in considering municipal government, but separation into these three branches is by no means so easy, on account of the greater overlapping of municipal functions. The judicial power is more a state than a municipal function, and will not be further considered, except to note the existence of municipal police courts for the prompt trial of persons arrested for misdemeanors or crimes and the exercise of judicial functions by city health departments and by city boards which regulate the rates and character of service of utility companies. The legislative functions of municipal governments are exercised primarily by the council, and the executive by various officers and boards, with the mayor as the chief executive officer. Under the commission plan of city government in its extreme form the commission (or council) exercises both legislative and executive functions, and under the city-manager plan the manager instead of the mayor is the chief executive officer. Some of the executive boards possess quasi-legislative powers, while others, such as boards of health, exercise both legislative and judicial functions. The mayor's duties may be legislative, judicial, and executive. He often presides over the meetings of the council, casts the deciding vote in case of a tie, usually has the power to veto ordinances, appoints officials, supervises the affairs of the city, hears and passes upon charges involving possible dismissal of officials, and sometimes acts as a judge of municipal courts. In the United States the mayor is elected by popular vote, though formerly he was quite generally elected by the council; elsewhere he is commonly appointed either by the city council or by the central government. (See MAYOR.) In point of training the mayors or chief burgomasters of Germany take the lead; in that country the mayoralty is a profession, and a successful officer is promoted from one city to another and larger as his ability and reputation increase. In all countries the mayor is the chief representative of the city, but in Great Britain alone the office is mainly one of dignity and honor. In that country the mayor is a member of the council and presides over its meetings, but he does not possess the veto power. The importance of the mayor's office in the United States is largely due to the control which (except in commission-plan cities) he quite generally exercises over legislation through his power of veto, and (except in manager-plan cities) to his usual power of appointing and removing executive officers. The latter power is generally subject to approval by the council, but it is in larger freedom from this restriction that the growing importance of the office (outside of commission-plan and manager-plan cities) chiefly consists.

The Council. The powers and duties of the city council vary greatly in the different countries of the world, and quite as much so in the several commonwealths of the United States or even in the cities of a single State. Germany leads in the comprehensive control of its councils over municipal affairs, and Great Britain ranks next in this particular. The German and British councils control schools and charities. While the German councils are in some respects subject to the board of magistrates, including the head magistrate, the burgomaster, or mayor, and while the latter has other important functions, the English council has full local control within its sphere. The French municipal councils, unlike those of Germany and Great Britain, have few or no administrative powers, their control being limited chiefly to the appropriation of money and questions of policy. In the United States the councils formerly closely resembled those of Great Britain, and frequently had control of charities and of other municipal activities, but one by one many of their powers were taken from them and bestowed on the mayor or else on independent boards. Among these boards may be mentioned water, sewerage, street, park, fire, police, and health boards, or combinations of two or more of these into a single board. Again, single-headed departments, more or less independent of the council, have been created by municipal charters or by special legislation. The financial control of some of these new bodies has been left with the city council, at least to the extent of making or withholding appropria-

tions and borrowing money by means of bond issues. Since the advent of commission government in the United States the commissions have been much like the British councils in power, except that the American commissions do not control the public schools. In Great Britain and the United States the councils are restricted to the exercise of those powers specifically or impliedly authorized by the state, and implied powers are seldom so construed as to warrant permanent loans, purchase of land, erection of buildings, or other public works. On the continent of Europe grants of municipal authority are far more general and limitations specific, but the central government exercises a general control and supervision over the municipalities unknown in the United States and rarely if ever practiced in Great Britain. In the latter country, however, the Local Government Board in sanitary matters, and the Board of Trade in the case of municipal enterprises which produce revenues, pass upon loans, and by their power of granting or refusing authority for these they exercise no little control over municipal councils. The council in the United States, particularly in small cities, is generally a single-chambered body, elected by districts, although in some States a part of the council is elected by the city at large, but there are still some instances of an upper house, the members of which may be elected by the city as a whole. In England the council sits as one body, but it is composed of councilors elected by the people and of aldermen chosen by the council, usually from its own membership. (See GREAT BRITAIN.) In continental Europe there usually is but one chamber of councilors, and frequently the members are elected on a general ticket. As a rule, the councils in European countries are far larger than those in the United States, containing from 50 to 150 members. In the United States, even where two chambers exist, there are rarely over 50 to 60 members, but Philadelphia is a notable exception, with nearly 200 members in both branches. Beginning with the twentieth century there has been a strong movement towards small councils in the United States, generally elected at large. The commission-plan cities usually have only five commissioners, or less in the smaller places. The tenure of municipal councilors is from one to four years in the United States; from one to three years in Canada; three years for councilors and six years for aldermen in Great Britain; four years in France and Spain; five years in Italy; six years in Austria, Prussia, Hungary, Holland, Belgium; and nine years in Bavaria. In most of the European countries provision is made for periodic renewal of the council. The usual rule is renewal by thirds or halves, annually, biennially, or triennially, according to the length of the term. The most universal legal qualification for councilmen, aside from age, is residence. In the United States councilmen must not only reside in the city which they represent, but, by written or unwritten law, within the district which elects them. In France any taxpayer is eligible, even though not a voter, provided the number of nonresident councilmen does not exceed one-fourth the whole. In England taxpayers residing within 15 miles of the municipality may be elected for any district thereof. Property qualifications for a portion of the members of the council are required in European countries, but in a few cities, including Dresden and Leipzig, half of the membership must be from non-property holders. In the United States property qualifications for membership in the council were formerly quite common, but are no longer required. In all countries the work of councils is largely done by committees, and this is particularly true of those countries where the council has large powers and duties, which doubtless accounts for the large bodies in Great Britain and elsewhere in Europe. In Chicago and in most small cities the presiding officer of the council is the mayor. In other American cities the council elects its own presiding officer or he is elected by the city at large. In Europe the council usually elects its own presiding officer. Generally speaking, members of municipal councils receive no salary, but in many cities of the United States members receive pay ranging from a small per diem allowance upward to what may be considered fair compensation for the time devoted to the work by the average councilman. In the American cities governed by commission, where the boards meet frequently and their members each take charge of an executive department, salaries are generally paid.

Executive Boards and Officers. These range from the mayor and council committees to the more or less independent boards and commissions so common in the United States, and on down to minor officials acting under these officers. The number and variety of services which these boards and officials perform has been partly indicated in the enumeration of the city's functions. In cities where the council is supreme the committees of that body exercise large executive powers. Great reliance, however, is placed on trained executive officers selected by such committees or by the council as a whole for the various departments of municipal activity. Outside of the United States such officials are seldom chosen by popular vote, but in that country it is not uncommon to choose many of these officers by popular election. Minor positions are, of course, filled by the board concerned or by the chief executive officer responsible for the work undertaken by the appointee, rather than by popular election or by the council. The town clerk is the most important official in an English municipal corporation. Besides his duties as recording officer of the council and general secretary of the municipality, he acts as legal adviser of the council and as custodian of records. His tenure of office is frequently for life, he receives a high salary, and he is a trained official much as is the mayor of a German city. The city clerk in the United States is never an officer of such training and importance. Generally he is simply a recording officer to the council, or perhaps a kind of mayor's assistant. Legal advice to the municipal authorities in the United States is given by an officer styled the corporation counsel, and suits are prosecuted and defended by a city attorney, although the two classes of service may be rendered by one man, and the names vary in different localities. The city engineer is usually a technically trained man, and municipal engineering has become a distinct branch of the engineering profession. In the large cities the legal and engineering work is so extensive and important as to require large staffs of experts. This is also the case in the financial department, using the latter term to embrace all the executive officers employed in assessing, collecting, and disbursing money

and in maintaining a check on collections and disbursements.

Finance. Municipal expenses and outlays are met from the proceeds of taxes, special assessments for benefits, like the frontage tax for street paving, various licenses and fees, the profits from public utilities and from loans, the proceeds of trust funds, and from bequests. Some cities of continental Europe receive no little revenue from landed property, and the cities of Great Britain and Germany, and a few in the United States, derive considerable revenue from municipal franchises. Where municipal ownership prevails in British cities effort is often made to turn into the common treasury a revenue for the reduction of the general tax rate. In the United States a portion of the revenue from water works, and less frequently from other utilities, is sometimes applied in a similar manner. The taxing power is generally limited to the council, the chief exception to this rule being the poor authorities in Great Britain, which have an independent power of taxation. In the United States the councils often have to raise large sums by taxation for independent boards, and also for the county and for the State. It is common for the independent boards to incur bonded indebtedness without consulting the council, but only as the authority, in general or specific terms, is granted by the State Legislature. The subdepartments under the general head of finance are tax assessors, who place a valuation on taxable property; a board of review or appeals from the rulings of the last-named officers; tax collectors; the treasurer, who receives money from the collectors; the disbursing officer or controller, who issues or approves warrants for the payment of bills and claims; and the auditing department. In some cities, particularly the smaller ones, the treasurer is also the disbursing officer, and the council instead of a controller may approve claims. The *municipal budget*, or the estimate of receipts and expenditures upon which the tax rate and appropriations are based, is prepared according to various methods. In general, the several departments make up their respective estimates, and these are amended by the mayor, or by a board or committee, and sent to the council for further amendment and final ratification. As a rule, cities of the United States are deficient in real budget making and also in following such budgets as they do make, but there have been marked improvements in both respects since 1900. A proper budget utilizes past experience with receipts and expenditures to formulate a programme for the ensuing year, and such a programme should be followed.

City Charters. The municipality being a mere creature of the state, its area, powers, and form of government are laid down by the legislature in the form of (1) a specific act or charter; (2) a given act for cities of a given class; or (3) a series of either general acts relating to groups of cities or to all municipal corporations; or (4) special legislation on any subject within constitutional limits. Strictly speaking, the first only is a city charter, but the other grants of power have the same general effect, except that (3) and (4) are successively more confusing and less satisfactory than (1) and (2). In the United States city charters may or may not be, as the Legislature sees fit, submitted to popular vote for approval except as this is regulated by State constitutions. Frequently both charters and charter amendments are so submitted, and where general municipal corporation acts prevail the transition from one class to another is generally by popular vote, but it may follow from an increase in population. As a rule, voters of a municipality have some voice or influence in framing new or amending old charters, except perhaps where general legislation prevails. This participation goes so far in some cases as to permit the framing of charters by an authorized charter commission or to the adoption of changes requested by the municipal officials. Missouri, California, and Washington led in placing charter making under the control of the municipality, subject to more or less specific legislative restrictions. Michigan and Ohio followed years afterward, and this kind of "municipal home rule" is being extended. The more general practice up to 1915 was for the State legislatures to control all charter making and mending, usually, but by no means always, leaving the adoption of the measures subject to local popular vote.

Other Municipal Problems. A comprehensive term used in discussions of municipal affairs is "municipal reform." This is nothing more or less than an effort to secure honest and efficient municipal government. The problem varies with each locality, and even changes in a given locality from year to year. The bane of municipal government is partisan politics. The remedy for bad municipal government, from whatever cause, invariably lies with the citizens and taxpayers, who are often too indifferent to their own interests, or at least to the public interest, to insist on good government. A decided reform in municipal affairs was effected in Scotland in 1833, and in England and Wales in 1835, as a result of agitation directed against incompetent and corrupt borough government. The reform acts of the year named were supplemented from time to time, and in 1882 a consolidated municipal corporations act was passed. In 1888 another act was passed, providing that cities and towns of more than 50,000 inhabitants should be administrative counties, and also creating a more unified government for Greater London, known as the London County Council. In 1900 this unification was carried still further, but only to the extent of reducing by consolidation into some 15 borough governments a large number of minor authorities. In the United States the progress of municipal reform, as reflected by changed methods of administration, is difficult to trace. This is largely due to the many independent State legislatures controlling municipal affairs, to the great variations of practice within each State, and to the spasmodic efforts for reform. One of the notable steps in many States has been the adoption of constitutional amendments, from 1850 to 1880, prohibiting special acts of the Legislature which apply to a single municipality. Other great agencies of municipal reform in the United States have been the various local, State, and national reform organizations, notable among which have been the good-government clubs, the American Civic Association, the National Short Ballot Organization, the National Municipal League, and the National Civil Service Reform League.

The Commission Plan. The most radical change in the government of cities in recent years has been the adoption in many cities of the commission form of government. The first city to adopt the plan was Galveston, Tex., in

1901. A few other cities followed soon afterward. In 1908 a more elaborate commission-plan charter went into effect at Des Moines, Iowa, and since then the plan has been widely adopted. At the beginning of 1915 more than 400 cities and towns throughout the United States had voted for government by this method.

Commission Government. The commission plan varies widely in different States and even within some of the States, in the latter case depending upon whether special or general legislation prevails. Its most distinctive feature is the combination of all legislative and executive powers in a single small body, typically five but sometimes seven or more in larger cities and sometimes three in the smaller cities. The members of the commission or council are elected at large and, except for the school authorities, are usually the only city officials to be elected—hence the term, "the short ballot." As a rule, the mayor, who is one of the commissioners, has no more power than his fellow commissioners, but he is the official head of the city. The administrative work of commission cities is divided into as many departments as there are commissioners. Each commissioner heads one of these departments, by virtue either of popular election to the position or through designation by the commission as a whole, as the charter or general law may provide. As a safeguard against vesting such large powers in so small a body and also in accordance with the increasingly democratic spirit of the day, the commission plan almost invariably includes the initiative, the referendum, and the recall. Under the initiative, a stated percentage of the voters may petition the commission to pass ordinances, or in some cases charter amendments. If the council does not see fit to pass the ordinances, then the question goes to popular vote. The referendum works in a like way as regards ordinances enacted by the commission. Similarly, by petition a popular vote may be had on recalling any elected officer, and sometimes appointive officers as well. Other usual features of the commission plan are nonpartisan nominations and elections and publicity.

The adoption of the commission plan sweeps away at a single stroke all the checks and balances and divided responsibility of the mayor-and-council plan and the many independent boards which often accompany it. In their place it sets up a single small responsible body subject to popular control. Administrative responsibility is still further defined by making each commissioner the head of a large municipal department. The very strength of the commission plan is also its weakness. It provides division commanders, but no commander in chief. It fills by popular vote executive offices, some of which call for men of high technical training and large technical experience and all of which call for men of great administrative ability. Instead of insuring the choice of such men, the accidents of popular election place laymen in these important positions. These speedily qualify in their own and the public eye as municipal experts and relegate the trained men far to the rear.

City-Manager Plan. To remedy this weakness of the commission plan, and also to make good some of the worst defects of the ordinary mayor-and-council plan, a considerable number of cities (perhaps 40 or more early in 1915) have adopted the city-manager plan. Carried to its logical end the manager plan makes the council the supreme and sole policy-determining and money-appropriating body and places the manager in supreme command of the executive forces of the city, which he and he alone selects, subject to whatever civil-service rules may exist. The manager plan was first tried at Staunton, Va., in 1908; was subsequently worked out more completely but not adopted at Lockport, N. Y.; and was put in full force at Sumter, N. C., in 1912. Most of the cities which had adopted the manager plan up to 1915 were quite small, the largest being Dayton, Ohio (population, 116,577 in 1910). It was also the small and relatively small cities which took up commission government at the outset, but it has since been adopted by New Orleans, St. Paul, Buffalo, Portland, Oreg., and Jersey City, to name only places which had a population of more than 200,000 in 1910. As a rule the manager plan has been adopted by cities under or about to come under the commission plan, whence the name commission manager. Although the manager plan appears to be a marked improvement on the commission plan and on at least the weaker variations of the mayor-and-council plan, it is yet to be proved by experience whether the manager plan will be as satisfactory in practice as in theory. The chief uncertainty lies in whether or how many American cities are yet ready to elect the sort of councilmen or commissioners who will, in turn, select and retain in office and refrain from meddling with really efficient city managers. It may be that after extended experience with both the commission plan and with the manager plan as an adjunct of both the commission plan and the weaker form of mayor-and-council plan there will be a reversion to the stronger type of mayor-and-council plan in which the council has only legislative powers and the mayor is the chief executive authority, with sole power of appointment and removal of practically all city officials except the members of the council.

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MUNICIPAL HOUSING. See TOWN PLANNING AND HOUSING.

MUNICIPAL/ITY, or MUNICIPAL CORPORATION. A town or city possessed of certain privileges of local self-government; also the governing body in such a town. Municipal institutions date back to the Roman Empire. The provincial towns of Italy, though subjected to the rule of a Roman official, were allowed to enjoy the right of regulating their internal affairs. A class of the inhabitants called the *curia*, or *decuriones*, elected two officers called *duumviri*, whose functions were supposed to be analogous to those of the consuls of the Imperial city, and who exercised a limited jurisdiction, civil and criminal. There was an important functionary in every municipality called the *defensor civitatis*, or advocate for the city, the protector of the citizens against arbitrary acts on the part of the Roman governor. The municipal system declined with the decline of the Empire, yet it retained a fair degree of vitality, and rose to renewed life in union with feudalism and with the Anglo-Saxon institutions of Great Britain. Indeed, some cities of Italy, France, and Germany have derived their present magistracy by direct succession from the days of Imperial Rome, as is notably the case with Cologne. The bishop, as the shield between the conquerors and the conquered, in many cases discharged the duties or obtained the functions of the *defensor civitatis*. To the north of the Alps, under the feudal system, he became officially the civil governor of the city, as the count was of the rural district. In southern Europe, where feudalism was less vigorous, the municipalities retained a large share of freedom and self-government. Of the cities of the Middle Ages some were entirely free. Venice, Genoa, Florence, Hamburg, and Lübeck all stood in this position. Next in dignity were the free Imperial cities in Germany, which, not being comprehended in the dominions of any of the princes, were in immediate dependence on the Empire. Most of these cities rose to importance in the thirteenth century, and their liberties and privileges were fostered by the Holy Roman emperors to afford some counterpoise to the growing powers of the immediate nobility. The chief organs of government in the German cities were the councils, usually one for deliberation and a smaller one for administration, both being chosen from the various trade and artisan guilds. There were also from two to four burgomasters in each city who presided over the council meetings. The Italian cities were governed by executive officers known as consuls, usually 12 in number. By the side of these were a council and a general assembly of the citizens. During the contest between the Italian cities and the Emperor an officer, called the *podestà*, was put in control of the cities which the Emperor succeeded in subjecting to his authority. Other cities, seeing the advantage of a single executive, voluntarily introduced this officer in place of the consuls. In southern France the Italian consular system existed, but occasionally the *podestà* appears as the chief municipal officer. In the northern part of France the *maire* and *échevins* were most frequently the governing authorities of the towns.

Before the Norman Conquest the English burghs were subject to the rule of an elective officer called the portreve, who exercised in the burgh functions similar to those of the shire reve in the shire. The Normans recognized the already existing privileges of the towns by granting them charters. One of the most important of these privileges was the *firma burgi*, or lease of the town to the inhabitants in consideration of the payment of a fixed sum in lieu of all feudal dues. This involved the right of the inhabitants to elect their own magistrates, the independent exercise of jurisdiction in their

payment of the local taxes, and the performance of the quota of taxes assigned by Parliament. A sheriff or viscount was placed by the King over each shire, and a bailiff instead of the former elective officer over each burgh. In the larger towns the bailiff was allowed to assume the Norman appellation of mayor. The municipal franchise seems to have been vested in all the resident and trading inhabitants, who shared in the payment of the local taxes and the performance of local duties. Titles to freedom of the town were also recognized on the grounds of birth, apprenticeship, marriage, and sometimes free gift. In all the larger towns the trading population came to be divided into guilds or trading companies, through membership in which admission was obtained to the municipal franchise. Eventually the whole community was enrolled in one or other of the guilds, each of which had its property, its by-laws, and its common hall, and the community elected the chief officers. It was on the wealthier and more influential inhabitants that municipal offices were generally conferred; and it gradually became the practice for these functionaries to perpetuate their authority by coöptation. Contentions and disputes arose regarding the right of election, and eventually the crown threw the weight of its influence into the scale of self-elective ruling bodies. This was the period of incorporation, when charters were granted incorporating, not the inhabitants of the town, but the governing body. No new governmental powers were conferred, but the corporations were given the right to hold property and to sue and be sued. The desire of the crown to control the representatives which the towns were now allowed to send to Parliament led to a reckless policy of granting municipal charters, so that presently the urban communities were overrepresented in Parliament. During the period of the early Stuarts the writ of *quo warranto* was used frequently to deprive the towns of their liberal charters, with a view to replacing them with charters of a less liberal type, in order that the crown might the more easily control the parliamentary representation of the towns. The burghs of Scotland had a history much like that of the burghs of England; their earlier charters were mere recognitions of already existing rights, and were granted to the inhabitants at large. In the course of the fourteenth and fifteenth centuries the municipal suffrage fell more and more into the hands of restricted bodies of men until an Act of 1469 gave to the councils the right of appointing their successors, the old and new councils together electing the office bearers of the corporation. This state of things continued till 1833, not without much complaint. In the Scottish burghs the several trades possessed a much more exclusive monopoly than in England. Along with the outcry for parliamentary reform arose an outcry for municipal reform, and a separate municipal reform act putting an end to the close system was passed for each part of the Kingdom.

In the United States the English system of municipal administration became the type for the government of the early towns and cities. In nearly every instance a special organization was provided for the cities and was outlined in a charter granted by the Colonial Legislature or by the crown. Generally the governing body of the municipality consisted of the mayor, recorder, aldermen, and councilmen. At first the corporation seldom acted as the agent of the State, but was an organ for the satisfaction of purely local needs, such as the management of local property and finance. It had no power of government except the right to issue local police ordinances. Gradually, however, the municipal corporation came to be an organ for the administration of matters of State concern, as well as of purely local matters. Thus, the regulation of matters relating to public education, the public health, poor relief, elections, local justice, etc., is quite generally intrusted to the municipalities. As now understood, therefore, a municipal corporation in the United States is a body politic and corporate created by the State for the purpose of State administration as well as of local administration, and vested with certain privileges, such as the right to hold property, to sue and be sued, etc. The transformation of the municipality from an organ of local government to an organ for the administration of central matters created the necessity for legislative control, which has had the result of depriving the cities to a very large extent of the management of their local affairs. The corporation is not the body of the people, nor is it the officers collectively considered, but rather that artificial body or legal entity created by the act of incorporation and limited thereby. A distinction must be made between a municipal corporation proper and what are known as quasi corporations not created upon petition of the people of the district, but rather as territorial or political divisions of the State, such as counties, townships, and school districts created for the convenience of State administration. The laws regulating the incorporation of English towns and cities have little application to municipal corporations in this country. Here none are founded on common law or royal charter, and but few are based upon prescription. It may be said that they exist only by legislative enactment, and possess no powers not created by statute. A few municipal corporations are created by charter singly, but general laws of incorporation have been passed in many States, and at the present time the constitutions of more than 20 States forbid the Legislature to incorporate cities and, as a rule, villages by special act. In 12 of these the prohibition extends also to amendments or changes of charters. When the incorporation is single or special the charter sets out that the inhabitants are constituted a body politic with such a name and style; that by that name they may have perpetual succession, and may use a common seal, sue and be sued, etc. The territorial boundaries are defined and provision made as to the form of government—usually by a council made up of aldermen and councilmen or by trustees—as to division into wards, qualifications of voters, powers of city council to collect debts and impose taxes, etc. General laws of municipal incorporation usually start by abolishing all special charters existing and establishing general regulations for the incorporation, government, and regulation of municipal corporations throughout the State. Frequently such laws classify the towns to be incorporated as regards their importance into cities of first or second grade, towns, and villages. To become operative, the charter granted by the Legislature must be accepted by the body of citizens to be incorporated.

When established the municipal corporation is,

in the absence of constitutional provisions to the contrary, completely subject to the power of the Legislature; thus, it has been held that the latter may repeal charter provisions allowing the licensing of liquor dealers, and even such as relate to police regulations. In other words, a municipal charter is not a contract, and may always be altered or revoked, with the important exception that the rights of existing creditors must not be disregarded. The Legislature has general control over public property; thus, it may authorize a railroad to occupy streets of a city without its consent and without payment therefor. But the courts are beginning to hold that the municipalities may also own private property which is not directly devoted to governmental purposes and which is no more subject to control of the Legislature than the property of private individuals. Such are wharves, cemeteries, ferries, libraries, parks, hospitals, etc. The Legislature cannot deprive the municipality of property of this kind, or direct that it shall be applied to other purposes, as, e.g., that land used for a city reservoir shall be converted into a public park. The power of the municipality to alienate its public property without legislative authorization has generally been denied by the courts, although the right to dispose of private property as it sees fit has been readily conceded. It is also a general rule that the public property of a municipal corporation is not subject to execution in satisfaction of a judgment. No exact form of words is necessary to give force to the charter, and the corporation may even be created by implication, as where powers and privileges are conferred upon the inhabitants of a locality which cannot be enjoyed or exercised without acting in a corporate capacity.

The powers which may be exercised by a municipality are such as are expressly granted in the charter, such as may be fairly implied therefrom, and such as are essential to the declared objects and purposes of the corporation—not simply convenient, but indispensable. Any fair or reasonable doubt concerning the existence of a power claimed is resolved by the courts against the corporation. That is to say, the rule of strict construction applies. In some of the recent decisions, however, there is evidence of a tendency to depart somewhat from this rule in the direction of conceding to municipal corporations wider powers, especially as regards the management of public utilities. Thus, it has been held that a municipality which has the right to establish an electric-light plant for lighting the streets may without an express grant from the Legislature distribute lights to private families. Where the city is given discretionary power upon any subject it is not for the courts to say whether such discretion has been wisely used or not, unless fraud is shown or the discretion is being manifestly abused to the oppression of the citizen. Thus, if it have power to open new streets or grade old ones when necessary for the welfare of the city, the question of necessity is one for the determination of its own authorities. But when a municipal corporation is empowered to take certain action for others, and it is beneficial for them to have it done, the law requires that it should be done, although the language is merely permissive in form. Among the principal powers usually conferred upon municipal corporations may be mentioned the right to acquire and hold such property as may be necessary to the proper exercise of other powers granted, the right of taxation and of eminent domain, the appointment or election of officers, the maintenance of local courts, the enactment of ordinances, and the maintenance of actions in the courts. Many special powers are given, such as relate to the incurring of loans, special assessments, licenses, police regulations, wharves, ferries, entertainment of guests, etc. It is a general rule of construction that the legislative power conferred upon municipal corporations cannot be delegated to other authorities, nor can they divest themselves of it in any manner whatever. The power to act for the general welfare of the city is usually granted, in addition to other powers expressly enumerated. Under this grant it is generally held that municipal corporations may pass such ordinances not inconsistent with other provisions of the charter or the laws of the State as may be expedient in maintaining the peace, good order, safety, and welfare of the community. Thus, they may enact ordinances to provide for a proper observance of the Sabbath, for the closing of saloons at night, for restraining domestic animals from running at large on the streets, for the suppression of vagrancy, for the prevention of cruelty to animals, etc. But the general-welfare grant does not authorize the municipality to levy taxes of any kind. As a result of their contractual powers, however, municipalities may incur debts, provided they are to be paid out of the ordinary income of the city for the current year. The better opinion seems to be that in the absence of a specific grant municipalities may borrow money where it is necessary to the successful existence of the corporation, or for the exercise of privileges granted. Where the Legislature imposes a duty on municipal corporations which necessarily involves large expenditures the power to borrow may be deduced. It has been held that where the city had express power to establish meat markets, a fire department, or a liquor dispensary, the power to borrow could be implied as a necessary means for carrying out these undertakings. It may be laid down as a rule, however, that municipal corporations have no general borrowing power or power to issue negotiable paper in evidence of debts without legislative authorization. The constitutions of many States contain provisions limiting the amount of indebtedness which municipal corporations may incur. The prohibition is usually construed to apply to indebtedness of all forms. It is, however, held by some courts that contracts for meeting the ordinary expenses of the municipality and in anticipation of receipts do not create an indebtedness within the meaning of the limitation. A municipality cannot escape liability for its obligation arising *ex delicto* by pleading that its indebtedness has reached the constitutional limit. Those who make contracts with a municipality whereby its indebtedness is increased do so at their own risk. If, therefore, an individual lends money to a city which has no legal power to borrow he cannot recover it by pleading ignorance of the powers of the city. But where municipal bonds contain recitals that the city is acting within its constitutional power, and has complied with all the requirements of the law, it will be estopped from disputing the truth of such representations as against a bona fide purchaser of the bonds.

The Legislature has no power to enact legislation which will have the effect of impairing the

obligation of a contract between the city and a private party. Thus, it cannot so limit the taxing power of a municipality as to render it impossible for the city to meet its ordinary expenses and pay interest on its outstanding bonds. On the other hand, the Legislature has no power to authorize a municipality to levy taxes for other than public purposes. Thus, it cannot authorize the granting of aid by a municipality (if it involves taxation) to a private enterprise to enable it to begin business. Among the public purposes for which a municipality may levy taxes may be mentioned the construction of sewers, the laying out of parks, the establishment of water works, etc. Moreover, the Legislature cannot levy a special tax upon the inhabitants of a municipality for other than strictly municipal purposes. Thus, it cannot require them to defray the expenses of improving a navigable stream or to take stock in a railway company, although they may be required to build a local canal or levee. The city may be compelled by mandamus to fulfill its obligations to private parties, as where it refuses to levy a tax for the purpose of paying interest on its outstanding bonds or for the satisfaction of judgments against it. The city may be enjoined from doing an injurious act to an individual or from committing trespass upon his premises. Furthermore, it may be enjoined at the instance of a taxpayer from violating the law or doing other acts prejudicial to the general welfare, as where the city proposes to enter into a contract which will create an indebtedness in excess of the constitutional limits. Municipal officers may also be proceeded against under a writ of *quo warranto* for usurping powers not legally conferred upon them. In the United States the practice of frequent interference in the affairs of the cities by the Legislature has led to so many abuses that in most of the recent constitutions provisions have been inserted prohibiting the legislatures from passing special acts which apply to a particular city when a general law can be made applicable. These provisions, however, have frequently been evaded by arranging the cities into classes in such manner that a particular city will constitute a class by itself and by making the act applicable to a single class. The practical difficulties of dispensing entirely with special legislation have led the courts in some instances to sustain the constitutionality of methods of classification which seem unreasonable if not ludicrous. Where a part of a municipality is detached from the main body of the city the old corporation retains all the liabilities and private property of the city if no provision to the contrary is made by legislation. Property of a public character falling within the limits of the new corporation passes into its control, the theory being that there has been no transfer of title, but simply a change of trustee. A new municipal corporation, embracing substantially the same boundaries as the old, is regarded in law as the successor of the old, entitled to all its property rights and subject to its liabilities. Upon the repeal of the charter of a municipal corporation a court of equity will lay hold of its private property and administer it for the benefit of the creditors of the corporation. It is a general rule of construction that if the existence of a municipal corporation is not questioned by the State it cannot be put in issue by a private individual in a collateral proceeding.

In discussing the liability of municipal corporations for torts it is necessary to distinguish between the two classes of powers which they exercise, viz., public governmental functions on the one hand and private corporate functions on the other. When acting in the former capacity municipal corporations are acting as the agent of the State and are governed by the rules of public law, one of which is the irresponsibility of the government for the tortious acts of its agents. When acting in a private local capacity, primarily for the advantage and benefit of the locality, the municipal corporation is subject to the rules of the private law, according to which it is held liable for the torts of its officers. The rule of liability for torts does not apply to quasi corporations, such as counties, townships, school districts, etc., because they are agencies of the State created for the purpose of State administration, and usually without solicitation or concurrence of action of the inhabitants. The principal torts which are imputable to municipal corporations when acting in the latter capacity are negligence, noncompliance with the statutes, nuisance, and trespass. The courts have generally held that municipal corporations are not liable for failure to exercise discretionary legislative power which may be conferred by the Legislature or for the manner in which they may exercise it if done in good faith. Thus, it is not liable for its neglect to abate a nuisance, as where an individual was injured by an explosion of fireworks which the municipality was authorized to prohibit. But where the duty is ministerial and absolute the corporation becomes liable for the injury arising because of failure to perform it, and where it positively licenses something which constitutes a nuisance it will be held liable for any injuries that may result therefrom. In the exercise of a discretionary power, as in the construction of a sewer, the city will not be held liable for injuries resulting from defective service unless it results in the positive invasion of an individual's property and unless it can be shown affirmatively that the municipality has been guilty of negligence. It is a general rule that a municipal corporation is not liable for injuries arising from neglect or failure to enforce strictly its ordinances for the good government of the city, but an act of the Legislature making the city liable for property destroyed by mobs has been held to be constitutional. In the exercise of its police powers the city is not generally liable for the acts of omission of its agents, as where a policeman shoots a bystander while attempting to kill a dog running at large. The same is true of negligence on the part of the fire department and of the health department. In all these cases the municipality is acting in its public governmental capacity as an agency of the State. In the management, however, of institutions not directly connected with the function of government, such as wharves, gas and water works, markets, and washhouses, municipal corporations are held liable for injuries that may result therefrom, the theory being that in this capacity the corporation is engaged in private business, from which often a revenue is derived. It is also a general rule that municipal corporations are responsible for the management of streets. The rule, however, does not apply to quasi corporations in the management of public highways. This is due to the fact that, unlike pure municipal corporations, they are

engaged chiefly in the performance of public governmental duties from which they do not generally derive any revenue or particular private advantage. The peculiar rule exists in New England that the property of any citizen of a municipality against which a judgment has been recovered may be seized in execution thereof. Elsewhere the remedy is execution upon the private property of the municipality. Consult: H. S. Abbott, *Treatise on the Law of Municipal Corporations* (3 vols., St. Paul, 1905); Eugene McQuillin, *Treatise on the Law of Municipal Corporations* (6 vols., Chicago, 1911–13); R. W. Cooley, *Illustrative Cases on Municipal Corporations* (ib., 1913); id., *Handbook of the Law of Municipal Corporations* (ib., 1914).

MUNICIPAL LABORATORIES. See LABORATORY.

MUNICIPAL LAW. In English and American law the ordinary "law of the land," i.e., of the country, comprehending both the public and the private law, as distinguished from the external law or law of nations. To the Romans, municipal law meant the special law of the cities, other than Rome, which were included in the Roman Empire. A *lex municipalis* was a city charter granting limited self-government in matters of local interest. On the Continent, towards the close of the Middle Ages, the phrase was sometimes used to describe any local law, whether of a city or a province, as contrasted with the general law of Christendom, i.e., the Roman law, civil and canon. Later, with the development of international law, municipal law came to describe local law in contrast with international law. The term is no longer used in this way on the Continent: municipal law now means city law as contrasted with national law; but among English-speaking peoples national law is called municipal in contrast with international law. English municipal law has thus become the very inappropriate description of all the law, written or unwritten, by which England is governed in matters purely English.

The expression "municipal law" is sometimes, however, employed in the United States in the continental sense above indicated, to describe the organization of municipal corporations and the local laws enacted and enforced by municipal authorities. It is under this head (municipal corporations), therefore, that information concerning the organization of city, county, township, and village governments, and police laws for the restraint of vice, may be found. See MUNICIPALITY. Consult Eugene McQuillin, *A Treatise on the Law of Municipal Ordinances* (Chicago, 1904), and Brand Whitlock, *On the Enforcement of Law in Cities* (Indianapolis, 1913). See INTERNATIONAL LAW; JURISPRUDENCE; LAW.

MUNICIPAL LEAGUE, NATIONAL. An organization composed of individuals and associations seeking to accomplish municipal reform in the various cities of the United States. It was established in New York in 1894 as the outcome of a national conference held in Philadelphia in January of that year to promote the interests of good government. The league has no partisan political interests whatever, but confines its operations to the securing of good municipal laws, the appointment of men of integrity and ability to office, and the correction of abuses in municipal methods of government in American cities. Through its annual conferences it enables the workers in behalf of municipal betterment to come into personal touch and exchange views. By means of active committees the league has brought together groups of acknowledged experts and public men who have formulated reports of great value to publicists, students, and administrators. Through its executive officers the league is in constant touch with local and national movements concerned with municipal questions. Its annual conferences are among the most important meetings of experts in municipal reforms in the United States, and the reports, including the secretary's annual review, the most valuable statements upon these subjects. In 1900 the league published a municipal programme for a constitutional amendment and municipal corporations act. In 1915 it issued a model charter prepared by a representative committee. Consult *Proceedings of National Municipal League*, 1894 to 1910 (Philadelphia, annually), and *National Municipal Review*, a quarterly periodical (Baltimore, 1912 et seq.).

MUNICIPAL OWNERSHIP. Possession by a municipality or any minor civil division of the state. The term is, however, more commonly limited to public as opposed to private ownership of water works, lighting plants, street railways, telephone systems, and other revenue-producing industries designed to meet the wants of urban populations. The term generally implies municipal operation as well as ownership, but exceptions are frequent and sometimes notable. The term "municipal socialism" has sometimes been used in much the same sense as municipal ownership; but it is more inclusive, embracing various efforts to meet the collective wants of a municipality, whether founded on municipal ownership or not. In its broadest sense, municipal socialism would provide for all wants common to the citizens of a municipality in so far as they were not met by the state. A narrower usage would apply the term more particularly to unusual municipal enterprises, such as the management of coal yards or bakeries. The term "municipal trading" has been applied in England to municipal ownership, but it has not gained currency outside of Great Britain.

The services which a municipality may be expected to render its citizens are more comprehensive than those included under municipal ownership, municipal socialism, or municipal trading, as may be seen by referring to the article MUNICIPALITY. The object of the present article is to consider those undertakings which require the use of the streets or other public places, and which might be carried on by either municipal or private enterprise, but are actually carried on by the former. Since by their nature such undertakings exclude competition, they are called natural or municipal monopolies. Under either kind of ownership they can be carried on only by authority from the state, in the form of general or special legislation, besides which a private corporation must generally secure the grant of a municipal franchise permitting it to use the public streets. Within the limitations stated the most common objects of municipal ownership are sewerage systems and water works and gas and electric-lighting plants. More rarely street railways, ferries, and telephones are owned by the municipality.

Aqueducts for the supply of the cities of antiquity were the nearest approach to municipal

ownership as the term is understood to-day, although from remote times cities have owned lands, improved harbors, built docks, and derived revenues therefrom. But these services were confined to a relatively small number of important cities until the nineteenth century, when water works, gas works, electric-light and power plants sprang up with increasing rapidity. At the opening of the twentieth century these services were to be found in practically all the larger and in the majority of the smaller municipalities of the civilized world, particularly in the United States, Great Britain, and to a less extent on the continent of Europe and in Australia.

The proper scope of municipal ownership is still a subject of debate. Perhaps the nearest approach to a general agreement is (1) that it may rightly embrace all those services which are primarily or largely of a sanitary character, like water supply and sewerage, and (2) that it should be restricted to quasi-public industries, in which private competition is impossible or at best uncertain. Under (2) some draw the line so as to include only imperative and universal needs, the supplying of which is at the same time a natural monopoly. The difficulty with such a limitation is that it varies with local conditions, time, and individual opinions. Thus, the demand for public lighting in the larger cities of the present day is far more imperative than was that for a public water supply a hundred years ago, or in some localities to-day. There is a growing conviction that the relative cheapness and efficiency of service are the chief facts to be considered in deciding between public and private ownership, and that local conditions determine whether public or private ownership is the better in these respects. A third point upon which there is more or less agreement is that municipal ownership should not be carried so far as to increase municipal debts beyond prudent limits. So far as revenue-producing municipal works of a monopolistic character are concerned, it is generally possible so to adjust income and expense that the revenue from such undertakings will meet capital charges as well as other expenses. But there is also the possibility that the popular demand for low charges will result in a deficit that must be met from the general tax rate, and with a large number of municipal undertakings to be provided for it is conceivable that this might prove financially embarrassing if not disastrous.

The municipal-ownership question has been given a different aspect in the United States with the rapid increase in the number and power of State public service or utility commissions. The control which these commissions now exercise over the rates and service of the various municipal-franchise companies makes it less necessary than formerly for cities to adopt municipal ownership for the protection of both public and private consumers. Nevertheless the movement for municipal ownership continues.

Water Works. With the exception of sewerage systems, which rarely yield a revenue, water works are the most common form of municipal utility.

In the larger cities of the United States municipal ownership is the rule, all but 8 of the 69 cities of over 100,000 population (census of 1920) owning their own works at the middle of 1922. New York, which was first supplied by a private company in 1776, put municipal works in operation in 1842. Chicago was supplied by a company in 1840, and by its own works in 1854. Philadelphia built its works in 1801. At Boston a private company established water works in 1652—the first public water supply in the United States. A second small company built works in 1796, and continued to operate on a small scale until 1893, when its pipes were bought by the city, which had built works in 1848. The Baltimore works were built by a company in 1807, and bought by the city in 1854. Cleveland built its works in 1854–56. At Buffalo a company established works in 1852 and was bought out by the city in 1868. In San Francisco the water works were still under private ownership in 1922, but the city was building a large dam and reservoir on the Tuolumne River in the Hetch Hetchy valley and a long aqueduct therefrom. By the time this project is completed the city expects to have bought the works of the company. At Cincinnati a company built works in 1820 and sold them to the city in 1839. Up to the close of 1896 changes from private to public ownership had occurred in 205 cities and towns, against only 20 changes from public to private ownership. There have been many changes to municipal ownership since 1896, but complete figures are not available.

In the *United States* in 1801 there were but 16 works, of which only the plant at Winchester, Va., was owned by the city it served. The development of municipal ownership during the century is shown by the accompanying table.

PUBLIC AND PRIVATE WORKS IN THE UNITED STATES

AT THE END OF EACH DECADE, BEGINNING WITH 1800 *

YEAR	Public	Private	Total	Per cent of total, public
1800	1	15	16	6.3
1810	5	21	26	19.2
1820	5	25	30	16.6
1830	9	35	44	20.5
1840	23	41	64	35.9
1850	33	50	83	39.7
1860	57	79	136	41.9
1870	116	127	243	47.7
1880	293	305	598	49.0
1890	806	1,072	1,878	42.9
1896	1,690	1,489	3,179	53.2

* Compiled from the *Manual of American Water Works* for 1897. Returns, summarized in the *McGraw Water Works Directory* (New York, 1915), show that of 4875 listed towns in the United States, 3045 had municipally owned works, 1355 privately owned, 37 mixed ownership (probably both public and private), and 435 were supplied from other towns. These figures cannot be directly compared with those given in the table because the classification in the *Manuel* is by works and in the *Directory* by towns supplied, and the *Directory* lists 435 towns supplied by works in other towns, without giving the ownership. No later figures for the whole country had been compiled up to July, 1922, but the U. S. Census Bureaus "Financial Statistics of Cities, 1920" indicated that in 1921 of the 253 cities of 30,000 population and upwards, 20.1 or 30 per cent owned their works.

The relative decrease in public ownership from 1870 to 1890 was due to the remarkable activity of private water company promoters at a time when the municipalities were just awakening to the need for such improvements, but lacked the funds for public ownership, or had not become infused with the spirit which would lead towards such ownership.

In *Canada*, in 1896, municipal ownership pre-

vailed in 75 per cent of the municipalities having works, or 109 of 145 cities and towns. In 1916 there were in Canada 396 municipal (75 per cent), and 132 private works or a total of 528 plants. At Montreal water works were built by a private company in 1801 and bought by the city in 1845. At Toronto private water works were built as early as 1841 and were bought by the city in 1873.

In *Great Britain* municipal ownership of water works is the general rule. Water works appear to have been introduced by the municipality of London in 1283, by Plymouth in 1585, and by Oxford in 1610. Manchester and Liverpool each bought out a private company in 1847, Glasgow in 1855, Birmingham in 1876, and Sheffield in 1888. Edinburgh transferred municipal works to a company in 1819, but they were restored to municipal ownership in 1869. Greater London was served for many years by eight companies, beginning with the New River Company, whose works were completed in 1613 with the aid of James I. The other seven companies dated from 1721 to 1822. After years of agitation for municipal ownership, a parliamentary Act was passed in 1902 providing for the purchase of the London companies and the control of the water supply by a joint board representing the several boroughs and the other public bodies comprised within what is known as Greater London. The transfer was made in June, 1904.

Most of the large cities of the *European continent* have extensive water works. Berlin secured control of her water works in 1873, buying them from a company which began to build them in 1853. Hamburg and Frankfort-on-the-Main, Vienna, Moscow, Paris, Rome, and other large cities own their water works. The municipal water works of Rome may be said to date from 312 B.C. (See AQUEDUCT.) At Paris an old Roman aqueduct was restored in the seventeenth century, and a small municipal supply seems to have been continued from that date until more adequate works were installed by the city about the middle of the nineteenth century. As a rule, private ownership prevails in Latin-speaking countries. In Australia there are a number of important municipal works.

Gas Works. In North and South America these are rarely under municipal ownership, but in Europe they are frequently owned by the municipality.

Of 981 towns in the *United States*, each having a population of 3000 and more by the census of 1900, returns for the close of 1901 showed 21 municipal works; but of these the Philadelphia plant was leased to a private company in 1897, after over 50 years of municipal ownership and operation. Two of the 21 municipal plants supply natural gas. The municipal works at Richmond, Va., were established in 1852. The thirteenth United States census (1910), in its volume on "Manufactures" (vol. x, Washington, 1913), reported for the United States, in 1909, 119 gas works owned and operated by the municipality. Of 11 others which were not owned or operated by firms, individuals, or corporations, 8 were coöperative associations.

Of 1615 gas works in *Great Britain and Ireland* reported in 1905, 285 were owned by the municipalities served, and they supplied about half the population involved. With the exception of London, Liverpool, and Dublin, nearly all the large towns have works owned and operated by the municipality.

In *Germany* most of the cities having a population of 50,000 and upward have municipal works, and as far back as 1885 figures for the whole country showed 338 municipal to 329 private gas works. Among the larger cities with private works are Munich, Frankfort-on-the-Main, and Altona.

Municipal works are found in most of the cities of Holland, Norway, Sweden, and Switzerland, and in a few cities of France, Italy, and Australia.

Sewerage. Municipal ownership is almost universal, but many countries are practically without sewerage systems for household wastes. It is doubtful if any country is better provided with sewerage facilities than the United States, where 1096 of the 1524 places with a population of 3000 in 1900 reported sewerage systems late in 1901. Of the 1096 places then having sewers, private ownership was reported in 47 instances, mostly in small places. Later complete figures are not available, but it is known that Atlantic City, N. J. (pop., 1920, 50,707), still had a privately owned sewerage system in 1922.

Street Railways. This class of service has been developed since 1850, and up to 1870 was confined chiefly to the United States. Municipal ownership outside of Great Britain is rare, and until 1893 Huddersfield, England, and the railway on the Brooklyn Bridge were the only examples of municipal ownership and operation, the first dating from 1882 and the second from 1883. A few British cities constructed railway tracks and leased them to companies between 1870 and 1893, since when most British cities have entered upon both ownership and operation of their lines, including London, Manchester, Sheffield, and Glasgow, but there are also private lines in some of the large places. The operation of the railway on the Brooklyn Bridge, New York City, was assumed by a private company in 1898, in connection with the Brooklyn railway service. In 1901 the small city of Grand Junction, Colo., assumed the ownership and operation of a short horse-railway line. San Francisco completed a municipal railway line on Geary Street in June, 1913, and which has since been extended. Seattle and Tacoma, Washington, began united street-railway ownership about the same time as San Francisco. On April, 1919, Seattle bought out the private lines. Detroit began building street railways vigorously in 1921, and early in 1922 bought the local lines of the Detroit United Railways System. In 1902 an electric railway at St. Thomas, Ontario, was taken over in like manner. The street-railway system of Toronto, Ontario, was bought by the city at the expiration of the franchise of a company in 1891. After being operated for a few months by the city it was sold to a company. In 1921, Toronto, which meanwhile, had built some lines, again bought out the company. Eight smaller cities in Ontario, one in Manitoba, three in Alberta and one in Saskatchewan had publicly owned street railways at the close of 1922, but some of the property was controlled by the Ontario Hydro-Electric Commission. In other countries than those already named there are a few street railways owned by the city and leased to operating companies. A subway to accommodate street-railway traffic in congested districts of Boston was completed by the city in 1897 and 1898 and leased to a company, and since then other subways have been provided in like man-

ner, including one to Cambridge, put in use in 1912. A rapid-transit subway built by New York City and leased to a company for operation was put in service in 1904, and has since been supplemented to form an extensive rapid-transit system in tunnel and in the open air. The leases of both the Boston and New York subways are on such terms that the rentals will eventually reimburse the cities for their outlay. In each case the operating companies provide all equipment. Since 1914 Philadelphia has made important extensions to its short subway system which had been in operation for some years, and Cincinnati has begun to build subways.

Electric Lights. This service was started on a practical scale in or about 1880.

Probably the first municipal plant in the *United States* was put in operation in 1882 at Fairfield, Iowa. At the close of 1898 there were in places of 1000 or over by the United States census of 1890, 460 municipal and 2572 private electric-lighting plants. In 1902 there were 815 municipal and 2085 private electric-lighting plants in the United States, regardless of the size and number of places supplied thereby, and in 1912 of a total of 5221 central stations 1562 were under municipal and 3659 under private ownership. The largest municipal plants are at Chicago and Detroit; but these, like many other American municipal electric-lighting plants, are for lighting streets and public buildings only.

The first electric-lighting plant in the *United Kingdom* was established by a private company in 1882. The oldest municipal plant was started by Bradford in 1889. At the close of 1901 there were only 248 works in operation in the United Kingdom, of which 168 were municipal. In addition, 84 municipalities and 31 companies were then installing works. Among the larger municipalities Glasgow bought out a company in 1892, Liverpool in 1897, Leeds in 1898, Sheffield in 1899, and Birmingham in 1900; Dublin built works in 1892, and in 1893 Edinburgh and Manchester did likewise. London is divided between municipal and private ownership.

On the *continent of Europe* private ownership of electric-lighting plants seems to be the rule. The works of Berlin were opened by a company in 1886, but the city controls their operation in important particulars. At Hamburg municipal works were put in operation in 1889.

Telephones. This service, like the telegraph, is generally controlled by large companies or by the general governments. Tunbridge Wells, England, and Glasgow, Scotland, inaugurated the first municipal telephones in Great Britain in 1901, and Swansea, Brighton, and Hull had followed by the close of 1905. The Tunbridge Wells plant was sold to the National Telephone Company. The English trunk lines and a large London exchange were long owned by the national postal authorities, and in 1912 all the lines and exchanges of the National Telephone Company were taken over by the National Post Office.

Ferries. In the United States there are perhaps 10 cities with municipal ferries to 70 with private ones. Boston was long the most notable example of municipal ownership in the United States, but in 1903 and in 1905 New York City took over the Staten Island and the East Thirty-ninth Street ferries from private companies. In Great Britain a large municipal ferry between Liverpool and Birkenhead is owned and operated by the latter municipality. Public bodies at Glasgow and at Belfast also control ferries. There are a few other municipal ferries in Great Britain.

Other Industries. The chief additional services that might properly be discussed under municipal ownership, as here considered, are docks and wharves and public markets. The former, particularly on a large scale, are more frequently found in Europe than in America; but for many years New York City has expended many millions on dock construction, and received a considerable yearly revenue from dock leases. Since 1900 many cities of the United States and Canada have gone extensively into dock construction and some into harbor improvements. Municipal markets are common in Europe, Australia, and Canada, where they are frequently exclusive in character. In the United States they exist, but they are in competition with private markets. Of cities and towns of over 30,000 inhabitants 129 were reported in 1901 to have municipal markets, but doubtless the list was incomplete, and at the same time it included some outdoor markets or market places. New York, Boston, Baltimore, and New Orleans have large markets, which yield considerable revenue. Since 1915 many American cities have given close study to the market problem and some have spent or are spending large sums of money for markets, spurred on by the "high cost of living" and other sociological considerations. Subways for electrical wires have been constructed in a number of American cities for lease to the various owners of wires. A few cities have built such subways for general use and for rental.

Bibliography. E. W. Bemis (ed.), *Municipal Monopolies* (New York, 1899); "Water, Gas, and Electric Light Plants under Private and Municipal Ownership," in *Report of the United States Commissioner of Labor* (Washington, 1900); J. A. Fairlie, *Municipal Administration* (ib., 1901); G. B. Shaw, *Common Sense of Municipal Trading* (Westminster, 1904); M. J. Francisco, *Municipalities and Private Corporations Compared* (Rutland, Vt., 1905); H. R. Meyer, *Municipal Ownership in Great Britain* (New York, 1906); F. C. Howe, *Municipal Ownership in Great Britain* (Washington, 1906); Leonard Darwin, *Municipal Trade* (new ed., New York, 1907); R. P. Porter, *The Dangers of Municipal Ownership* (ib., 1907); Lord Avebury, *On Municipal and National Trading* (2d ed., ib., 1907); H. R. Meyer, *Public Ownership of the Telephone in Great Britain* (ib., 1907); Leonard Darwin, *Municipal Ownership* (ib., 1907); W. G. Towler, *Socialism in Local Government* (ib., 1909); Douglas Knoop, *Principles of Municipal Trading* (London, 1912); Yves Guyot, *Where and Why Public Ownership Failed* (New York, 1914); Morgan and Bullock (comps.), *Selected Articles on Municipal Ownership* (2d ed., White Plains, N. Y., 1914); Thompson, *Municipal Ownership* (New York, 1917); Lincoln, *Results of Municipal Electric Lighting in Massachusetts* (Boston, 1918); Todd, *Municipal Ownership with a Special Survey of Municipal Gas Plants in America and Europe* (Chicago, 1919); also references under MUNICIPAL GOVERNMENT.

MUNICIPAL REFORM ACTS, ENGLISH.

The various acts passed by Parliament in the nineteenth century aiming to reform the government of the English municipalities. The parliamentary reform of 1832 having left untouched the notorious abuses in the English system of municipal government, a parliamentary commission was appointed the following year to investigate exhaustively the general condition of municipal corporations throughout the Kingdom. A monumental report was made by the commission showing that the municipal governments were in the hands of self-elected cliques; that the corporate funds were wasted; that public improvements were almost wholly neglected; that the municipal courts were corrupted and prostituted for party purposes; and that the whole system of municipal institutions as then constituted was a source of weakness rather than of strength to the country at large. The report of the commission was followed by the Municipal Corporations Act of 1835, which has been well called "the great charter of English municipal freedom." By this act 178 boroughs were reformed, 125 others given corporate privileges, and provision was made for the remedying of many defects and the correction of the most notorious abuses of the municipal system. It admitted to the franchise all property owners and occupiers of property rated at £10 per annum, and established a uniform system of municipal organization. This scheme provided first for an elected council varying in size according to the population of the borough; the council was to be a bicameral body, the upper house consisting of a certain number of aldermen elected by the council. The act further provided for a mayor to be chosen by the body of councilors and aldermen from among their own members. The mayor, aldermen, and councilors were to constitute the full municipal governing body. The chief features of this act have remained as the framework of the English municipal constitution, although the various acts of Parliament passed from time to time modifying in unessential particulars the municipal structure made a consolidation and revision of the statutes necessary. This was accomplished by the consolidated municipal code of 1882. By the Local Government Act of 1888 the municipal constitution was modified to the extent that cities and towns with a population of 50,000 inhabitants were made distinct counties for administrative purposes, the municipal councils assuming all duties which would otherwise devolve upon county councils. Consult: M. D. Chalmers, *Local Governments* (London, 1883); F. J. Goodnow, *Comparative Administrative Law*, vol. i (New York, 1897); G. B. Shaw, *Municipal Government in Great Britain* (ib., 1901). See works referred to under MUNICIPAL GOVERNMENT; MUNICIPALITY.

MUNICIPAL UNIVERSITY, AKRON. See BUCHTEL COLLEGE.

MUNICIPIUM, mū'nĭ-sĭp'ĭ-ŭm (Lat., from *munus*, duty, service, especially to the state, and *capere*, to take; apparently, the taking up of public services. Some, however, take *munus* as "privilege," and interpret "of the receiving of political privileges"). A term used by the Romans to denote the relation of certain towns to the Roman state. It was first used when Tusculum (see FRASCATI) received Roman citizenship, in 381 B.C. It came into greater prominence at the close of the Latin War, 338 B.C. Henceforth, in their relation to Rome, the towns of Italy were (1) *Coloniæ Civium Romanorum*, whose members were full citizens of Rome, or (2) *municipia*, whose members had partial Roman citizenship, or (3) *Civitates Fœderatæ*, whose members were not Roman citizens at all. The members of the *municipia* had, at first, in general, the *jus connubii* and the *jus commercii*, i.e., the right of intermarriage with citizens of Rome and the right to do business with them, but they did not possess the *jus suffragii*, the right to vote at Rome, or to hold office there. This *jus suffragii* was, however, given to many municipia in the second century B.C. A great change came after the Social War (q.v.). Henceforth, by the Lex Plautia Papiria every town in Italy proper might, on certain clearly defined conditions, gain Roman citizenship, and the term *municipium* was now applied to every urban group of Roman citizens in Italy. The municipium in this developed form had local self-government, and its citizens could also vote and hold office at Rome itself. Julius Cæsar extended this system to Cisalpine Gaul; Augustus and later Emperors extended it throughout the Empire, by giving full or partial citizenship to various towns. Consult the articles "Colonia" and "Civitates Fœderatæ" in W. Smith, *A Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890); A. J. H. Greenidge, *Roman Public Life* (ib., 1901); J. E. Granrud, *Roman Constitutional History* (Boston, 1902); L. Friedländer, *Town Life in Ancient Italy* (Eng. trans. by W. E. Waters, ib., 1902); F. F. Abbott, *A History and Description of Roman Political Institutions* (3d ed., ib., 1911); J. S. Reid, *The Municipalities of the Roman Empire* (Cambridge, 1913); the article "Municipium," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914).

MUNISING, mū'nĭ-sĭng. A city and the county seat of Alger Co., Mich., 45 miles east-southeast of Marquette, on the Munising, Marquette, and Southeastern Railroad (Map: Michigan, C 2). The chief industry is lumbering. It has a fine hospital, and there are tanneries, paper mills, and manufactories of veneer and woodenware. Pop., 1900, 2014; 1910, 2952.

MUNJAH. See MOONJA.

MUNK, mŭnk, HERMANN (1839–1912). A German physiologist. He was born at Posen, studied at Berlin and Göttingen, and in 1862 became docent in the former university. Seven years afterward he was promoted to assistant professor, and in 1876 to professor, of physiology at the veterinary college at Berlin. Besides studies on the productive methods of threadworms Munk wrote on the physiology of the nerves and especially on the brain: *Untersuchungen über das Wesen der Nervenerregung* (1868); *Ueber die Funktionen der Grosshirnrinde* (1881; 2d ed., 1890); *Ueber die Ausdehnung der Sinnessphären in der Grosshirnrinde* (1901–02); *Ueber die Functionen des Kleinhirns* (1906–08); *Zur Anatomie und Physiologie der Sehsphäre der Grosshirnrinde* (1910).

MUNK, JENS (1579–1628). A Danish navigator, born near Arendal, Norway. In 1619, under the auspices of King Christian IV, he set out with two ships to discover the Northwest Passage to the Indies and China. He penetrated Davis Strait as far north as 69° and then turned southward and spent the winter on Chesterfield Inlet. Cold, famine, and scurvy destroyed so

many of his men that only two persons besides himself survived. With these he sailed for home, reaching Bergen, Norway, in September, 1620. Just when ready to start on a new Northwest Passage journey to take possession of "New Denmark" for the Danish crown he died. An account of his first voyage was published at Copenhagen in 1623 as *Efterretning af Navigationen og Reisen til det Nye Danmark af Styrmand Jens Munk*, new edition by Peter Lauridsen (Copenhagen, 1883); C. C. A. Gosch, *Danish Arctic Expeditions 1605 to 1620*, vol. ii, Hakluyt Society, No. xcvii (London, 1897).

MUNK, Salomon (1803–67). A French Orientalist. He was born in Glogau, Silesia, of Jewish parents, studied Oriental languages at Berlin, Bonn, and Paris, and in 1842 was made custodian of Oriental manuscripts in the Paris National Library. He accompanied Montefiore and Crémieux to Egypt, bringing back many valuable manuscripts. Although he had become blind, he was in 1865 appointed professor of Hebrew, Chaldee, and Syriac in the Collège de France. He was a member of the Académie des Inscriptions et Belles-Lettres, and published an edition (with French translation) of the *Guide of the Perplexed* (1856–61) by Moses ben Maimon. (See Maimonides.) His further works include *Palestine* (1845) and *Philosophie chez les Juifs* (1848).

MUNKÁCS, mụn'käch. A town in the County of Bereg, Hungary, situated on the river Latorcza, 69 miles east-southeast of Kaschau (Map: Hungary, H 2). It has manufactures of coarse cloth, flour, spirits, a refinery of petroleum, and trade in lumber, cattle, and grain. In the vicinity are mined alum, iron, and crystals. The fortress of Munkács, situated on a rock near the town and used as a prison, is noted for its many sieges, especially for its defense against the Austrians, to whom it surrendered in 1688 after a siege of three years, the garrison having been commanded by Helen Zrinyi, the wife of the patriot leader Tökölyi. Pop., 1900, 14,416; 1910, 17,240.

MUNKÁCSY, mụn'kä-chē, Michael (1844–1900). An Hungarian historical and genre painter, whose real name was Michael Lieb. He was born at Munkács, Feb. 20, 1844, the son of a petty official, became an orphan at an early age, and in 1855 was apprenticed to a joiner. After several years of hard work and privation chance threw him in the way of the portrait painter Szamossy at Gyula, who aided and befriended him, as did also the landscape painter Ligeti, at Budapest, whither Munkácsy had gone in 1863. A small grant from the art society there enabled him to study for a year (1865) at the Academy in Vienna, under Rahl, after which he proceeded to Munich, where he studied under Alexander Wagner and found a special protector in Franz Adam, the battle painter. In 1868 he went to Düsseldorf to work under Knaus. Two years later his first important picture, "The Last Day of a Condemned Man" (in the collection of Mrs. W. P. Wilstach, Philadelphia), took Paris by storm, bringing him the gold medal. His future was forthwith assured, and in 1872 he took up his residence in Paris, where for several years he continued to depict episodes from the popular life of his native country with impressive truthfulness and a sombre, blackish coloring. In 1876 he entered upon a new field, painting a series of charming Paris interiors, in which he adopted a richer coloring, but his most important production of this period was "Milton Dictating Paradise Lost" (1878, Public Library, New York). It was not, however, until 1881 that he reached his own ideal with the completion of the now world-famous "Christ before Pilate" (John Wanamaker, Philadelphia), which has become one of the most widely discussed pictures of recent times. It was exhibited all over Europe and in the United States in 1886, on which occasion Munkácsy visited New York. In 1884 he painted his second biblical subject, "Christ on Calvary" (Dresden Gallery), which, like its predecessor, is replete with dramatic life, treated in the light of history with ethnographic reality. It also was brought to America in 1887, and the artist's next important work, "The Last Moments of Mozart" (1886), a touching representation of the dying composer rehearsing his famous *Requiem*, found its way into the collection of Gen. Russell A. Alger, Detroit, Mich. His subsequent creations were of a decorative character and comprise the "Apotheosis of the Fine Arts," for the Art-Historical Museum in Vienna, and "Arpád Taking Possession of Hungary" (1896), for the new House of Parliament in Budapest. In the same year he painted his last important canvas, "Ecce Homo." The strain and disappointments connected with this work brought on a mental disease, and the artist passed the last three years of his life in a sanitarium at Endenich, near Bonn, where he died, May 1, 1900. Many of the prominent public and private collections of the United States contain examples of his paintings. "The Pawnbroker's Shop," "The Music Room," and "The Two Families" are in the Metropolitan Museum, New York; "The Prowlers of the Night" is in the Pennsylvania Academy, Philadelphia, and "The Story of the Battle" in the Walters Gallery, Baltimore. Munkácsy's reputation has not been maintained at the height it reached during his lifetime, and he is frequently criticized for his overdramatic interpretation of sacred themes and for the sooty effect of his color. Consult: T. R. Tait, "Michael Munkácsy," in *American Art Review*, vol. ii (Boston, 1881); F. W. Ilges, "M. von Munkácsy," in *Künstler-Monographien*, vol. xl (Bielefeld, 1899); Tahi, in *Die Kunst für Alle*, vol. xv (Munich, 1900).

MUNN, Orson Desaix (1824–1907). An American publisher and patent attorney, born at Monson, Mass. He was educated at Monson Academy. In 1846, in conjunction with Alfred E. Beach, he established the firm of Munn & Co. and bought the *Scientific American*, which had been founded six months before and which, under this management, became one of the leading popular scientific journals in the United States. In 1876 the *Scientific American Supplement* was established, and in 1885 a monthly magazine called the *Architects and Builders Edition*, now known as *American Homes and Gardens*. Under O. D. Munn's supervision Munn & Co. became the largest firm of patent attorneys, and is now the oldest, in the United States.

MÜNNICH, mụ'nĭk, Burkhard Christoph, Count (1683–1767). A Russian general and statesman, born at Neuenhuntorf in Oldenburg, Germany. In the War of the Spanish Succession he served as captain of Hessian troops. He became a colonel in the Polish army in 1716,

entered the Russian service in 1721, and six years afterward became general. He was created commander in chief of the Russian army by Peter II in 1727 and in 1732 was made field marshal and president of the War Council. He superintended the work on the Ladoga Canal and played a distinguished part in the war with Turkey, overran the Crimea in 1736, and, advancing beyond the Dniester, made himself master of Moldavia. After the death of the Empress Anna Ivanovna in 1740, he opposed the party of Biron, the Regent, whom he overthrew. The regency was conferred on Anna Karlovna, mother of Ivan, the young heir to the throne, and Münnich became chief Minister and the most powerful man in Russia. After the coup d'état which placed Elizabeth Petrovna on the throne (1741), Münnich was arrested, and the sentence of death passed upon him was changed only at the foot of the scaffold to exile in Siberia, where he remained for 20 years. Peter III restored to him his estates in 1762, and he was made director general of the Baltic ports by the Empress Catharine. Münnich's *Diaries* have been variously published, notably by Herrmann (Leipzig, 1843). Consult: G. A. Halem, *Geschichte des Feldmarschalls Grafen Münnich* (new ed., Oldenburg, 1838); the Russian biography by N. Kostomarov (St. Petersburg, 1884); the *Memoirs* of Münnich's son, Ernest, edited by Arved Jurgensohn (Stuttgart, 1896); Jansen, *Nordwestdeutsche Studien* (Berlin, 1904).

MUÑOZ, mōō'nyōth, JUAN BAUTISTA (1745–99). A Spanish historian, born at Museros, Valencia, and educated at the University of Valencia. His leading work was *Historia del nuevo mundo* (1793), which Charles III had commissioned him to write. It follows the course of American discovery down to 1500. The council of the Indies, to which he had been appointed cosmographer (1770), forbade its publication; but Charles IV sanctioned it, despite the author's revelations concerning the atrocious treatment of the aborigines by Spaniards in the New World. Some writings of Muñoz are to be found in the collections of the Academy of History, Madrid, but many of his manuscripts were burned in the library of Valencia when that city was stormed by the French (1812).

MUNRO, mŭn-rō', DANA CARLETON (1866–). An American historian, brother of Wilfred Harold Munro, born at Bristol, R. I. He was educated at Brown University (A.M., 1890) and at the universities of Strassburg and Freiburg (1889–90). He was instructor and assistant professor of Roman and mediæval history at the University of Pennsylvania from 1893 to 1902 and then professor of European history at the University of Wisconsin until 1915, when he accepted a chair at Princeton. In 1904–06 also he directed the summer sessions of the University of Wisconsin. From Brown he received the degree of L.H.D. in 1912. He served as editor of *Translations and Reprints from the Original Sources of History* (1894–1902); was author of *A Syllabus of Mediæval History* (7th ed., 1913), *A History of the Middle Ages* (1902), and *A Source Book of Roman History* (1904); coauthor of *Mediæval Civilization* (1904, 1906) and *Essays on the Crusades* (1902); and editor of the department of mediæval history for the NEW INTERNATIONAL ENCYCLOPÆDIA.

MUNRO, DAVID ALEXANDER (1845–1910). An American editor and Greek scholar. He was born at Maryburgh, Scotland, and graduated M.A. from the University of Edinburgh in 1872. Subsequently he came to New York City, where he was employed in the literary department of Harper and Brothers. He edited *Garden and Forest* in 1887–89, and then became connected with the *North American Review*, of which he was general manager in 1889–96, editor in 1896–99, and thereafter assistant editor until his death. He supervised the American contributions to an edition of *Liddell and Scott's Greek Lexicon;* arranged the comparative *Greek-English New Testament* for Harper and Brothers; and collaborated on Dr. Schaff's *Companion to the Study of the Greek New Testament.*

MUNRO, HUGH ANDREW JOHNSTONE (1819–85). An eminent English classical scholar. He was born in Elgin, Scotland, was educated at Shrewsbury School, under B. H. Kennedy (q.v.), and at Trinity College, Cambridge. From 1869 to 1872 he served as the first university professor of Latin at Cambridge. His edition of Lucretius (1864; 4th ed., 1885), with commentary and prose translation, remains one of the standard English contributions to Latin scholarship. His edition of Horace (1868), containing a valuable introduction and illustrations from ancient gems (selected by C. W. King), and his *Criticisms and Elucidations of Catullus* (1878; 2d ed., 1905) are also highly esteemed. Munro contributed to the *Journal of Philology* and other learned periodicals, on Greek subjects (Aristotle, Euripides), as well as Latin, and wrote much Greek and Latin verse, to be found in the volume known as *Sabrinæ Corolla*, published by B. H. Kennedy, and *Translations into Greek and Latin Verse* (1884). Consult J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908), and J. D. Duff, in preface to a new edition of Munro's translation of Lucretius (Bohn Classical Library, London, 1908).

MUNRO, NEIL (1864–). A Scottish novelist, born at Inveraray, Argyllshire, and educated at the parish school. Subsequently he entered the office of the Glasgow *Evening News*. The author of tales and romances dealing with life in the Scottish Highlands, Munro received the degree of LL.D. from Glasgow University. His writings include: *The Lost Pibroch* (1896); *John Splendid* (1898); *Gilian, the Dreamer* (1899); *Doom Castle* (1901); *Children of the Tempest* (1903); *The Clyde* (1907); *Fancy Farm* (1910); *Ayrshire Idylls* (1913); *The New Road* (1914).

MUNRO, or **MONRO**, ROBERT (?–c.1680). A Scottish soldier. Between 1626 and 1638 he served in continental wars under the King of Denmark and under Gustavus Adolphus. He then joined his countrymen in their rebellion against Charles I. In 1642 he had charge of an expedition against the Catholic rebels in Ireland. When the Civil War broke out the English Parliament in 1644 placed Munro in command of the Parliamentarians in Ulster. He captured Belfast in that year, but in 1646 was routed in the battle of Benburb by the Irish leader, Col. Owen Roe O'Neill. When Ormonde, Charles's lieutenant general in Ireland, made peace with Parliament, Munro and his Scottish followers refused to surrender Carrickfergus and Belfast and to return to Scot-

land. Thereupon Munro was taken prisoner by Monk in 1648, was confined in the Tower of London for five years, and thereafter lived on his wife's estates in Ireland.

MUNRO, ROBERT (1835–1920). A Scottish anthropologist and archæologist. He was born in Ross-shire and was educated at the University of Edinburgh, studying medicine. He was a practicing physician at Kilmarnock until 1886, after which he devoted himself entirely to prehistoric archæology. He was lecturer on archæology in 1888 and 1910 at Glasgow and on anthropology at Edinburgh in 1911, and from 1888 to 1899 was secretary of the Society of Antiquaries of Scotland. At Edinburgh he founded the Munro lectureship on anthropology and prehistoric archæology. Munro wrote: *Ancient Scottish Lake-Dwellings or Crannogs* (1882); *The Lake-Dwellings of Europe* (1890; in French, 1908); *Rambles and Studies in Bosnia-Herzegovina and Dalmatia* (1895; 2d ed., 1900); *Prehistoric Problems* (1897); *Prehistoric Scotland* (1899); *Man as Artist and Sportsman in the Paleolithic Period* (1904); *Munro Lectures: Paleolithic Man* (1912; delivered 1911 at Edinburgh); *Prehistoric Britain* (1914).

MUNRO, SIR THOMAS (1761–1827). A British soldier and administrator. He was born in Glasgow and was educated at the university there. Having decided to enter the service of the East India Company, he went to Madras in 1780, but was soon compelled to serve in the campaign against Hyder Ali (q.v.). After further military service, chiefly under Lord Cornwallis, Munro had his first experience as an administrator, though in a subordinate position, in Baramahal, a district ceded in 1792 by Tippu Sahib (q.v.), son of Hyder Ali. His sound judgment, together with his attentive sympathy with the natives, was shown in a number of reforms which ultimately were adopted throughout a large part of British India. Chief among these was the ryotwar land tenure, providing for small holdings from the government by paying a land tax. Another test of his ability was found as administrator successively of the Canara, Ballari, Cuddapah, and Karnul districts, and the Palnad. He put down rebellion, suppressed crime and extortion, and applied his enlightened ideas with vigor and success. His sound views as to the larger policy by which the East India Company could maintain its power while governing with justice brought him into close consultation with the authorities in London, to which he returned in 1807, remaining there seven years. Again, in 1814, he went to Madras for the purpose of organizing a judicial and police system. He took part in the second Mahratta war, after which he went once more to England, returning in 1819 as governor of Madras. This position he held until 1826. Consult John Bradshaw, *Life of Sir Thomas Munro*, in the "Rulers of India Series" (London, 1894).

MUNRO, WILFRED HAROLD (1849–). An American historian, brother of Dana C. Munro. He was born at Bristol, R. I., and was educated at Brown University (A.B., 1870; A.M., 1873) and at Freiburg and Heidelberg. He was a master (1870–71) and president (1881–89) of De Veaux College at Niagara Falls, N. Y.; associate principal of St. Mark's School at Salt Lake City (1871); spent 1873 in South and Central America; and in 1875–79 served as principal of the Le Roy (N. Y.) Academic Institute. At Brown he was associate professor of history and director of university extension in 1891–99, and professor of European history from 1899 until his retirement in 1911. He is author of *The History of Bristol, R. I.* (1880); *Picturesque Rhode Island* (1881); *The Most Successful American Privateer* (1913); *Some Legends of Mount Hope* (1915); and is editor of *Works of W. H. Prescott* (22 vols., 1905–06) and *Record Book of the Rhode Island Society of Mayflower Descendants* (1911).

MUNRO, WILLIAM BENNETT (1875–). An American authority on municipal government. He was born at Almonte, Ontario, Canada, and was educated at Queen's University, Kingston (B.A., 1895; M.A., 1896), Edinburgh (LL.B., 1898), Harvard (Ph.D., 1900), and Berlin (1900–01). He was instructor in history and political science at Williams College in 1901–04, and at Harvard he served as instructor in government in 1904–06, as assistant professor in 1906–12, and thereafter as professor of municipal government. He became president of the Harvard Coöperative Society, university editor of the *Harvard Graduates' Magazine*, and associate editor of the *American Political Science Review*. He is author of *Canada and British North America* (1904); *The Seigniorial System in Canada* (1907); *Documents Relating to the Seigniorial Tenure* (1908); *The Government of European Cities* (1909); *Initiative, Referendum, and Recall* (1911); *Government of American Cities* (1912; new ed., 1913).

MUNROE, mŭn-rō′, CHARLES EDWARD (1849–). An American chemist and educator. He was born at Cambridge, Mass., graduated from the Lawrence Scientific School (Harvard) in 1871, and in the same year became assistant in chemistry. From 1874 to 1886 he was professor of chemistry at the United States Naval Academy, and then devoted himself to the study of explosives. In 1886 he was appointed chemist to the torpedo corps at Newport, R. I., and in 1892 received a chair in chemistry and the post of senior dean in Columbian (now George Washington) University. He served as president of the American Chemical Society in 1898, and was special agent of the United States Census Bureau in 1900, 1905, and 1910. Munroe invented a smokeless powder, and attained a reputation as an authority on explosives. His publications include: *An Index to the Literature of Explosives* (1886); *Lectures on Chemistry and Explosives* (1888); *A Primer on Explosives for Coal Miners* (1909, 1911).

MUNROE, HENRY SMITH (1850–). An American mining engineer. He was born in Brooklyn and was educated at Columbia University (M.E., 1869; Ph.D., 1877). He served as an assistant geologist of the Ohio State Geological Survey in 1870–71 and as assistant chemist of the United States Department of Agriculture in 1870–72; participated in a geological survey of Yezo, Japan, in 1872–75; and was professor of geology and mining at the University of Tokyo in 1875–76. At Columbia he was adjunct professor of surveying and practical mining in 1877–91 and professor of mining until his retirement in 1915, a member of the university council after 1895, and dean of the faculty of applied sciences in 1897–99. He was president of the Mining and Metallurgical Society of America in 1908–09 and of the

Society for the Promotion of Engineering Education in 1909.

MUNROE, KIRK (1850–). An American writer of books for boys, born near Prairie du Chien, Wis. He studied civil engineering at Harvard and while professionally engaged on the routes of the Northern and the Southern Pacific railways gained material for many of his tales. Afterward he worked for various newspapers in New York City, and was the first editor of *Harper's Round Table* (1879–82). After his marriage to a daughter of Amelia Barr, the novelist, he went to reside in southern Florida, a district that often colored his writings, which include: *The Flamingo Feather* (1887); *Dorymates* (1889; new ed., 1903); *Cab and Caboose* (1892; new ed., 1913); *Canoemates* (1892; new ed., 1903); *Raftmates* (1893, 1903); *The Fur Seal's Tooth* (1893); *At War with Pontiac* (1895); *With Crockett and Bowie* (1897); *Under the Great Bear* (1900); *The Belt of Seven Totems* (1901); *The Outcast Warrior* (1905); *For the Mikado* (1906).

MUN'SEE. A subtribe of the Delaware (q.v.), originally constituting one of the three great divisions of that tribe and dwelling along the upper streams of the Delaware River and the adjacent country in New York, New Jersey, and Pennsylvania. They were considered the most warlike portion of the tribe and assumed the leadership in war councils. From their principal totem they were frequently called the Wolf tribe of the Delaware. They were prominent in the early history of New York and New Jersey, being among the first tribes of that region to meet the whites. By a noted fraudulent treaty known as the Walking Purchase, the main body was forced to remove from the Delaware River about the year 1740. They settled on the Susquehanna, on lands assigned them by the Iroquois, but soon afterward moved westward and joined the main Delaware tribe on the Ohio River, with whom the greater portion eventually became incorporated. A considerable body, who were converted by the Moravian missionaries, drew off from the rest and formed a separate organization, most of them removing to Canada during the Revolution. Others joined the Ojibwa and Stockbridge Indians. The majority were incorporated in the Delaware, with whom they participated in their subsequent wars and removals. Those who still keep the name of Munsee are in three bands, two of which are consolidated with other tribal fragments, so that no separate census is available. These tribes are the Munsees of the Thames, Ontario, Canada; Munsee (or Christian) and Chippewa, northeastern Kansas; and Stockbridge and Munsee, Green Bay Agency, Wis. According to the census of 1910 there are 71 in the United States.

MUNSELL, mŭn'sĕl, JOEL (1808–80). An American editor, publisher, and antiquary, born at Northfield, Mass. He settled in Albany, N. Y., in 1827, as a printer, and passed from that occupation to journalism. He subsequently became the editor of various publications, among which were the *New York State Mechanic*, the *Lady's Magazine*, and the *New England Historical and Genealogical Register*. He rendered valuable services to the cause of American history by publishing the *Annals of Albany* (10 vols., 1849–59); *Collections on the History of Albany* (4 vols., 1855–57); and a series of books, some of considerable value, known as the "Munsell Historical Series." The owner of a very large collection of books on the history of printing in the United States, Munsell wrote *Outlines of the History of Printing* (1839) and *A Chronology of Paper and Paper-Making* (1856; 3d ed., 1876).

MUNSEY, mŭn'sĭ, FRANK ANDREW (1854–). An American publisher, born at Mercer, Me. In 1882 he established at New York City the *Golden Argosy*, afterward changed to the *Argosy*. In 1889 he founded *Munsey's Weekly*, which he changed to the monthly *Munsey's Magazine* in 1891. The last-named periodical was the pioneer among ten-cent magazines. He also founded the *Puritan* and the *Junior Munsey*, and some time after purchased the Washington *Times* (1901); the New York *Daily News*, which he conducted from 1901 to 1904; the Boston *Journal* (1902); the Baltimore *News;* the Philadelphia *Evening Times*, which was discontinued in 1914; and the New York *Press*. He became publisher also of the *All-Story Magazine*, the *Scrap Book*, the *Cavalier*, the *Railroad*, and *Current Mechanics*. When the new Progressive party was organized in 1912 Munsey became one of its most ardent supporters and one of the largest contributors to its campaign expenses. He is author of *Afloat in a Great City* (1887); *The Boy Broker* (1888); *Under Fire* (1890); *Derringforth* (1894).

MUNSON, mŭn'son, JAMES EUGENE (1835–1906). An American inventor, born at Paris, Oneida Co., N. Y. He studied for a time at Amherst, then removed to New York City, where he became a court stenographer, a position which he held for more than 30 years. He formulated the Munson system of stenography and invented an automatic typesetting machine and a mechanism for operating typewriting machines by telegraph. His publications include: *Complete Phonographer* (1866; rev. ed., 1894); *Dictionary of Practical Phonography* (1874; 2d ed., 1906); *The Phrase-Book of Practical Phonography* (1889); *Phonographic Dictation Book* (1904); *A Shorter Course in Munson Phonography* (1901; 2d ed., rev., 1912).

MÜNSTER, mŭn'stĕr. The capital of the Prussian Province of Westphalia, situated in a level district on the Aa and on the Dortmund-Ems Canal, 65 miles northeast of Düsseldorf (Map: Germany, B 3). The town is mediæval in appearance, with its ancient gabled buildings, old Renaissance houses, rococo dwellings of the eighteenth century, arcaded markets, and shaded allées. The site of the former fortifications, which divided the old and new towns, has been converted long since into promenades. Münster has many churches, of which two are prominent —St. Lambert's and the cathedral. The former is a graceful, pleasing structure. It is Gothic, dates from the fourteenth century, has been restored in recent times (since 1868), and possesses a majestic new tower 312 feet high. The church is associated with the history of the Anabaptists in the sixteenth century. The cathedral (thirteenth century) is a striking edifice, but disfigured with modern decorations. The imposing Gothic church of Our Lady (c.1340) also merits mention as well as the beautiful Romanesque tower of St. Ludger's (1170).

The Rathaus is a handsome, gabled, fourteenth-century Gothic structure. The Peace of Westphalia was signed in it in 1648, in a curious room called the Friedenssaal, which con-

tains portraits said to have been painted by Terburg. Among the interesting old buildings are also the Renaissance Weigh House; the Renaissance Stadtkeller, the headquarters of the Kunstverein, with pictures of minor value; and the Schuhhaus, or the ancient guildhall of shoemakers. The castle (1767) was formerly the episcopal residence and is now occupied by civil officials. In its grounds is a botanical garden. The government offices, the law courts, and the attractive Gothic post office are modern. The modern Ludgerus Fountain is adorned with interesting religious statues. The Roman Catholic university, which ceased to exist as such in 1818, when the institution was reduced to a theological and a philosophical faculty (which figured as the Academy of Münster from 1843), was revived in 1902 by the establishment of a faculty of law. (See MÜNSTER, UNIVERSITY OF.) Other educational institutions include three Gymnasia, a Realgymnasium, a Realschule, etc. Noteworthy also are the royal pedagogical seminary, a seminary for priests, a museum of Christian art. There is a notable zoölogical garden, which is much frequented by the citizens and contains an antiquarian collection. The industrial products of Münster include leather, linen and cotton fabrics, starch, thread, and sugar. There are also carriage works, breweries, and distilleries. A large trade is carried on in the produce of the country. The population in 1871 was 24,815; in 1901, 63,776; in 1903 certain suburbs were annexed to the commune, so that the 1905 census showed 81,439 inhabitants, of whom 58,632 were returned as Roman Catholic and 10,711 as Evangelical; the 1910 census disclosed a population of 90,254.

History. Münster had its origin in a celebrated monastery which appears as early as the time of Charles the Great. A considerable settlement sprang up around the monastery in the first part of the twelfth century. The town received municipal rights about 1180, and in the course of many years the inhabitants succeeded in vindicating their liberties as against their feudal lords, the bishops of Münster. In the thirteenth century Münster entered the Hanseatic League. In the fifteenth century it became a centre of learning and religious life, and during the Reformation suffered greatly from the strife of parties. In 1533 Münster fell into the power of the Anabaptists, whose leader, the celebrated John of Leyden (q.v.), erected the city into a kingdom of Zion with himself as sovereign (1534). The city was taken by the Bishop in the following year, and John of Leyden was put to death. Against the ambitious and warlike Bernhard of Galen, Bishop of Münster, the city carried on a desperate struggle in defense of its rights, but it was finally compelled to submit with the loss of almost all its liberties (1661). The bishopric of Münster, which held a prominent place among the ecclesiastical states of the old German Empire and embraced a territory of nearly 4000 square miles, was secularized in 1803.

MUNSTER, mŭn'stĕr. The largest of the four provinces of Ireland, occupying the southwest part of that country and bounded north by Connaught, east by Leinster, and west and south by the Atlantic (Map: Ireland, C 7). It contains the six counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford. Area, 9532 square miles. Pop., 1841, 2,404,460; 1901, 1,070,188; 1911, 1,035,495, almost entirely Roman Catholics.

MÜNSTER, SEBASTIAN (1489–1552). A German theologian and geographer. He was born at Ingelheim, studied at Heidelberg and Tübingen, and in 1529 left the Catholic church for the Reformed. He was professor of theology and Hebrew at Heidelberg until 1536, when he became professor of mathematics at Basel. He edited in 1534–35 the first Hebrew Bible to appear under the care of a German. But his chief work was his *Cosmographia* (1544), a geography which was translated into Italian, French, and Latin, and passed through 24 editions in 100 years.

MÜNSTER, mŭn'stĕr, UNIVERSITY OF. One of the more recently established Prussian universities, although historically it is connected with numerous efforts to establish such an institution in Münster. The Jesuits conducted there in 1588 the Gymnasium Paulinum, and university privileges were obtained from the Pope in 1629 and from the Emperor in 1631, without, however, much result. Another papal bull was obtained in 1773, but war and lack of endowments prevented any advance, which was further delayed by the establishment of the University of Bonn in 1808. An Akademische Lehranstalt was maintained at Münster, with chairs in law and theology (Catholic). New chairs were added from time to time after 1875, together with museums, laboratories, and other equipment. In 1900 funds were raised by the city and the Province of Westphalia; in 1902 the faculties of theology, philosophy, and law and political science were given the rank of university, which in 1907 received the title of the Westfälische Wilhelms-Universität. A complete medical faculty has not yet been established, but five semesters of medical work are provided. The enrollment in 1913 was 2356. The university library contains 224,709 volumes, about 175,000 pamphlets, as well as a large number of incunabula and manuscripts.

MÜNSTERBERG, mŭn'stĕr-bĕrg, HUGO (1863–1916). A German-American psychologist, born in Danzig. He received the degree of Ph.D. at Leipzig in 1885 and that of M.D. at Heidelberg two years afterward and taught psychology at Freiburg for five years (1887–92). In 1892 he became professor of psychology and director of the psychological laboratories at Harvard University. In 1910–11 he was Harvard exchange professor at the University of Berlin. Münsterberg served as president of the American Psychological Association (1898) and as vice president of the International Congress of Arts and Sciences (St. Louis, 1904) and of the International Philosophical Congress (Heidelberg, 1908). Münsterberg was the organizer and first director of the Amerika-Institut of the German Government (1910–11) and became a fellow of the American Academy of Arts and Sciences. His early interests were mainly in the field of physiological psychology; but in later years he devoted himself in part to problems of idealistic philosophy and in part to the application of psychological laws to the problems of everyday life. As a result of the latter interest he published a number of books in popular style dealing with the psychology of testimony, of medicine, of education, etc., and he finally undertook a systematic treatment of applied psychology under the name

of psycho-technics. His more important publications are: *Die Willenshandlung* (1888); *Gedankenübertragung* (1889); *Der Ursprung der Sittlichkeit* (1889); *Beiträge zur experimentellen Psychologie* (1891); *Psychology and Life* (1899); *Grundzüge der Psychologie* (1900); *American Traits* (1901); *The Americans* (1904); *Eternal Life* (1905); *Science and Idealism* (1906); *On the Witness Stand* (1907); *Psychotherapy* (1908); *Philosophie der Werte* (1908); *The Eternal Values* (1909); *Psychology and the Teacher* (1909); *American Problems* (1910); *Psychology and Industrial Efficiency* (1912); *American Patriotism* (1913); *Grundzüge der Psychotechnik* (1914); *Psychology, General and Applied* (1914); *The War and America* (1914); *The Peace and America* (1915). After 1903 Münsterberg edited the *Harvard Psychological Studies.*

MÜNSTER-LEDENBURG, mụn'stēr-lā'den-bụrk, Ernst Friedrich Herbert, Count zu (1766–1839). A Hanoverian statesman. He was born at Osnabrück, studied at Göttingen, and in 1788 entered the governmental service of Hanover. For three years (1801–04) he was Ambassador to St. Petersburg, and as Cabinet Minister at London immediately afterward did much to bring about the entente between Russia and England against Napoleon. In 1813–14 he was at the headquarters of the allied forces, and he was a member of the Vienna Congress (1814–15). In Germany his programme was progressive, but anti-Prussian; the constitution of the Kingdom of Hanover and its formation in the midst of Prussia may be considered typical of his policy. In 1831 Münster retired from office. Consult Hormayr, *E. F. H. Graf Münster* (Jena, 1875).

MÜNSTER-LEDENBURG, Georg Herbert, Count zu; also Baron of Grotthaus and Prince of Derneberg (1820–1902). A German diplomat, son of the foregoing, born in London, England. He was educated at Bonn, Heidelberg, and Göttingen, served for a time in the first chamber of the Hanoverian Parliament, and from 1857 to 1865 was Envoy Extraordinary of the Government of Hanover at the court of St. Petersburg. After the annexation of Hanover to Prussia in 1866 he declared himself pro-Prussian, and from 1867 was a member of the Upper House. He represented Goslar in the Diet of the North German Confederation from 1867 to 1870 and in the German Reichstag from 1871 to 1873. He became Ambassador at London in 1873, at Paris in 1885, and in 1900 retired from the diplomatic service. In 1899 he was a member of the Peace Conference at The Hague. He wrote several works on contemporary German and continental public affairs, including *Politische Skizzen über die Lage Europas vom Wiener Kongress bis zur Gegenwart* (1867) and *Der norddeutsche Bund und dessen Uebergang zu einem deutschen Reiche* (2d ed., 1868).

MUNTANER, mōōn'tâ-nâr', En Ramón (1265–1336). A Spanish chronicler, born at Peralada in Catalonia. He became a wandering soldier and minstrel and for 30 years led an adventurous life, serving with Roger de Flor in Sicily (1300), with the celebrated Almogávares against Asia Minor, and becoming Governor of Gallipoli and later of Jerba. Returning to Catalonia, he began in 1325 to write in Catalan the history of the princes of Aragon from the time of James the Conqueror to the coronation of Alfonso IV. This chronicle of great events, of which he was an eyewitness, is valuable for the history of his time and is remarkable for its accuracy. It remained in manuscript until the middle of the sixteenth century. The most ancient editions of the original are those of Valencia (1558) and Barcelona (1562). The former is entitled *Chronica o descripcio dels fets e hazanyes del inclyt Rey Don Jaume Primer . . . e de molts de sos descendens, etc.* It has been translated into German, Italian, and French. Karl Lanz published an edition of the original in 1844, *Chronik des edlen En Ramon Muntaner* (vol. viii, Bibliothek des literarischen Vereins in Stuttgart, 1844). Consult also the edition by A. de Bofarull (Barcelona, 1860).

MUNTHE, mụn'te, Gerhard Peter Frants Wilhelm (1849–). A Norwegian decorative painter and illustrator, born in Elverum. He was educated in Christiania, Düsseldorf, Munich, and Paris. Returning home (1883) as a pronounced realist, he painted the brilliant "Haymaking" (1884), "The Peasant's Garden" (1886), and "From Eggedal" (1888), all in Christiania Gallery. As a result of his studies of Old Norse art he exhibited in 1893 "Eleven Fantasies Illustrating Norwegian Fairy Tales," decorative water colors, among which are "Afraid in the Dark," "The Lovers," and "The Horse of the Goddess Hel." These were reproduced in tapestry and became very popular. In the Royal Castle, Christiania, hang his "State-Tapestries" ("The Golden Portal," "King Sigurd and Balduin"). Munthe decorated residences, art institutions, and King Haakon's Hall, Bergen, and illustrated, among other books, Snorri's *Saga.* "From Nitedal" (1905, Christiania Gallery) and "Bergen from Flöifjeldet" are representative of his later landscapes.

MUNTHE, Ludvig (1841–96). A Norwegian landscape painter, born at Aaröen, near Bergen. He was first given instruction by Schiertz, a German painter and architect at Bergen, and then became a pupil of Flamm at Düsseldorf, which he subsequently selected for his permanent residence. A thoroughly realistic treatment characterizes his paintings, of which autumn and winter scenes in stormy or gloomy weather, forest and coast views form the prevailing subjects, and which may be judged by such specimens as a "Pine Forest in Winter" (1870), Hamburg Gallery; "Wood Interior in Winter, with Stags" (1878), National Gallery, Christiania, which was awarded the gold medal in Paris; "Birch Wood in Autumn" (1886) and "Autumn in Holland" (1895), both in National Gallery, Berlin. He was appointed Swedish court painter and Prussian professor.

MUNTJAC (Javanese nāme). Any of a genus (*Cervulus*) of small Oriental deer which dwell solitarily in the jungle and whose young are spotted. The species best known is that of India, called barking deer by Anglo-Indian sportsmen, or kakar (*Cervulus muntjac*) by the Hindustani. It is a little larger than a roebuck. Its lyrate antlers are peculiar in that they rise from pedicels about 5 inches high, or as long as the antler itself, and have only one short basal spur. The female has no antlers, nor has she the great exposed upper canine tusks, which, like those of the musk, are the effective weapons of the bucks in their fights. Allied species, some with smaller horns, are found in China and the Malayan islands, and an interesting fossil genus (*Amphitragulus*), in-

habiting Tertiary Europe, was totally hornless in both sexes. See Plate of FALLOW DEER, MUSK, ETC., with the article DEER.

THE INDIAN MUNTJAC.

MÜNTZ, mụnts, CHARLES ACHILLE (1846–). A French agricultural chemist, brother of Eugène Müntz. He was born at Sulz, Alsace, studied under Boussingault at Paris, and after acting as his assistant for 10 years, succeeded him as director of the chemical laboratories of the Institut National Agronomique. Müntz became a member of the Institute of France. The reports of his investigations, published largely in *Annales de l'Institut National Agronomique*, *Annales Agronomique*, *Annales de la Science Agronomique*, and *Comptes Rendus de l'Académie des Sciences*, include important contributions to such diverse subjects as nitrification; soils, fertilizers, and plant nutrition; foods, feeds, and animal nutrition; viniculture; irrigation; and sewage purification and utilization in agriculture. Müntz was associated with Schlösing in some of the earliest work on nitrification, and together they were the first (1877) to establish by experiment the true nature of nitrification, viz., that it is a biological rather than a purely chemical process. He made feeding experiments with large numbers of cattle and horses, and vinicultural experiments in a large number of vineyards, publishing important reports on these subjects (*Recherches sur l'alimentation des chevaux*, with Girard, 1884, and *Les vignes*, 1895). With Girard he is the joint author of a large treatise on fertilizers, *Les engrais* (1888–91). Other subjects upon which Müntz and his associates published notable reports are the effect of late irrigation on grapes (1899), agricultural value of the soils of Madagascar (1901), nitre and the national defense (1905), intensive nitrification and high-yielding nitre beds (1907), diffusion of fertilizer salts in the soil (1908), purification of sewage by means of peat beds (1909).

MÜNTZ, EUGÈNE (1845–1902). A French art critic, brother of Charles Achille Müntz, born at Sulz, Alsace. He took Taine's place as professor of the history of art at the Ecole Nationale des Beaux-Arts, where he lectured from 1885 to 1893 and filled other important positions. One of the first in France to treat the history of art as a science, he made a specialty of Italian art, and the following works are of unique value: *Notes sur les mosaïques de l'Italie* (1874–92); *Les arts à la cour des papes pendant le XVème et le XVIème siècle* (1878–98); *Raphaël* (1881; revised, 1885; new ed., 1900; Eng. ed., London, 1882); *Les précurseurs de la Renaissance* (1881); *Histoire de la tapisserie* (1882; 5th ed., 1903); *Etudes sur l'histoire de la peinture et de l'iconographie chrétiennes* (1882); *Histoire de l'art pendant la Renaissance* (3 vols., 1888–95); *Léonard de Vinci* (1899); *Pétrarque* (1901). He also contributed important articles to the *Gazette des Beaux-Arts* and other periodicals, and was a member of both the Academy and the Superior Council of the Fine Arts.

MÜNZER, mụn'tsĕr, THOMAS (c.1489–1525). A religious enthusiast, communist, and popular leader of the German Reformation, born at Stolberg in the Harz Mountains. He acquired a good knowledge of theology, taught at Aschersleben and Halle, became in 1519 chaplain of a nunnery at Beutwitz, and in the following year received a call as preacher to Zwickau. There he gained great popularity by his attacks on the monastic and mendicant orders. In 1521 he was compelled to leave the town, and went to Bohemia, where his preaching, however, met with little sympathy. In 1523 he became pastor at Allstedt in Thuringia, married a nun who had abjured her vows, and carried on his pastoral work in full sympathy with the advanced representatives of the Reformation. He was an ardent champion of German nationality, and was the first to substitute German for Latin in the liturgy. He stood in close touch with Carlstadt and shared the latter's radical ideas. In time he developed a fanatic mysticism whose chief tenet was the validity of inner revelation, and he attacked as "new papists" those reformers who set up the gospel above personal justification. His ideas partook also of a political and social nature; he preached the speedy coming of God's kingdom on earth, and sought to organize the peasants and the artisans of the towns into secret associations looking, it is asserted, to the destruction of all authority and the establishment of communal property. In August, 1524, he was expelled from Allstedt and betook himself to Mühlhausen, where he joined forces with Heinrich Pfeifer, a renegade monk, who had succeeded in gaining great influence over the lower classes. Together they were driven from the city in September, and Münzer wandered through southern Germany and Switzerland, forming close relations with the Anabaptist leaders and hastening in no small degree the peasant uprising in those regions. He returned to Mühlhausen in December and, with Pfeifer, who had likewise reëntered the city, assumed leadership of the discontented masses. The old council was overthrown and a new council was installed under the control of Münzer. Mühlhausen speedily became the centre of a violent agitation. The opposition of the nobles was ineffectual; but at Frankenhausen, on May 15, 1525, Münzer's peasant mob was almost annihilated by the force of Philip of Hesse, the Elector of Saxony, and the Duke of Brunswick. (See PEASANT WAR.) Münzer escaped from the battlefield, but was captured at Frankenhausen and taken to the castle of Heldrungen, where he was put to the torture. On May 25 he was decapitated at Mühlhausen, together with Pfeifer and 24 other leaders of the peasants. Fanatic though he undoubtedly was, there is nothing to disprove Münzer's warm love for the common people, whose cause

he upheld against Luther, accusing the latter of fawning on the German princes while seeking to appease the peasants with empty words about the responsibility of rulers to God. Consult: Strobel, *Leben, Schriften und Lehren Thomas Münzers* (Nuremberg, 1795); Seidemann, *Thomas Münzer* (Dresden, 1842); also critical bibliography and article by Alfred Stern in *Allgemeine deutsche Biographie*, vol. xxiii (Leipzig, 1886); O. Merz, *Thomas Münzer und Heinrich Pfeiffer* (Göttingen, 1889); J. S. Schapiro, *Social Reform and the Reformation* (New York, 1909).

MUNZINGER, mun'tsĭng-ēr, Werner (1832–75). A Swiss traveler and linguist. He was born at Olten, was educated at Bern, Munich, and Paris, and in 1852–53 was connected with a mercantile establishment at Alexandria, Egypt. He was attached to the expedition of Von Heuglin in 1861, but quitted it when it reached north Abyssinia, and in company with Kinzelbach explored an unknown territory. In 1862 he was placed at the head of the German exploring expedition, succeeding Heuglin, but was unable to penetrate farther than Kordofan. In 1865 he was appointed British Consul at Massowah and in the Anglo-Abyssinian War acted as a guide to the English forces, after whose withdrawal he remained at Massowah as Consul in the French service. In 1870 he made a journey to southeast Arabia, and was appointed by the Khedive Governor of Massowah (1871). In 1872 he was made Pasha and Governor-General of the eastern Sudan, and in 1875 was mortally wounded while leading an expedition against Abyssinia. He published: *Sitten und Recht der Bogos* (1859); *Ostafrikanische Studien* (1864; 2d ed., 1883); *Vocabulaire de la langue Tigré* (1865); *Die deutsche Expedition in Ostafrika* (1865).

MUONGS, mōō'ŏngz. A people who, together with the Thos, also dwelling in northeastern Tonkin and Annam and the adjoining parts of China, constitute, in the opinion of some leading anthropologists, one of the four chief groups of the Tai stock, of which the Siamese are the best-known members. The Farther Indian Muongs inhabit the basin of the Black River, and the Thos that of the Claire, while the great mass of the primitive population of the Chinese provinces of Kwangsi, southern Kweichow, northwestern Kwangtung, eastern Yunnan, and perhaps also the Le of the island of Hainan, belong in this group of primitive Tai peoples. The Pueun and Pu-tai of Annamese Laos closely resemble in physical characteristics and language the Muongs of Tonkin. A number of the Thos-Muongs tribes have methods of writing of their own resembling those of the Laotians, and apparently not derived from Chinese, even in the case of the tribes of this group resident in China. Like some others of the primitive population of this part of the world, they impress one as being rather non-Mongolian in physical characters. Their eyes, especially, are often almost straight.

Bibliography. Baber, *Travels in Inland and Western China* (London, 1882–86); A. R. Colquhoun, *Across Chryse* (ib., 1883); B. C. Henry, *Ling-Nam* (ib., 1886); Bourne, *Journey in Southwestern China* (ib., 1888); Alexander Hosie, *Three Years in Western China* (ib., 1890); Frédéric Garcin, *Au Tonkin: Un an chez les Muongs* (Paris, 1891).

MURA, mōō'rȧ. A populous but inferior tribe of Tupian stock (q.v.), residing along the Amazon River, Brazil, from the confluence of the Madeira as far as the Purús. They were formerly very formidable and hostile to the Portuguese, but were completely crushed by the Mundurucú (q.v.) in 1788. Since that time some of them have come into the Portuguese settlements for protection and have acquired a rudimentary civilization; but those of the interior and upon the Purús are still in their original savage condition. Their houses, grouped in small villages, are mere roofs supported upon poles, without walls. They do not cultivate the ground, but live upon fish, game, and wild fruits, using bows six feet long, spears, and well-made canoes. They are much addicted to a sort of narcotic snuff prepared from the seeds of a species of mimosa. They were formerly naked, but those near the settlements now wear clothing. They carry on a trade with the Brazilians in sarsaparilla, turtle oil, and Brazil nuts, in exchange for cotton cloth, knives, spear and arrow heads. They are described as lazy, drunken, dishonest, and quarrelsome, and are among the lowest of all the Amazonian tribes.

MURAD, mōō'rȧd. The name of five Turkish sultans. See Amurath.

MURADABAD, mōō'rŭd-ȧ-bȧd', or **MORADABAD.** The capital of a district of the same name, United Provinces, British India, on an elevation on the right bank of the Ramganga, 50 miles northwest of Bareilly (Map: India, D 3). Its chief features are the great mosque, built in 1631, an American Methodist mission church, built in 1874, and the Anglican church of St. Paul. The cantonment and civil administrative offices are on the northwest. Muradabad is noted for its engraved brass ware, has cotton factories and many printing establishments. There is an extensive trade in sugar, wheat, rice, and other products of the district. The town is administered by a municipal council of 23 members, 18 of whom are elected. Muradabad was founded by Rustam Khan in 1625. The ruins of his fort, with brick walls from 4 to 6 feet in thickness, overlook the river. Pop., 1901, 75,128; 1911, 81,168.

MURÆNA, mů-rē'nȧ. A fish. See Moray.

MURAI CHŪZEN, mōō'rī' chōō'zĕn'. A Japanese physician and mathematician of the eighteenth century. He wrote the *Kaishō Tempei Sampō* (1765), which treated of the solution of numerical higher equations. His *Sampō Dōshi-mon* (1781) is noteworthy because of its treatment of circulating decimals.

MU'RAL CIRCLE. An astronomical instrument formerly used for measuring the declinations of stars. The principle of its construction was somewhat similar to that now used for the meridian circle, by which it has been replaced. See Meridian Circle.

MURAL CROWN. In heraldry, a crown in the form of the top of a circular tower, masoned and embattled, conferred on one who was the first to mount the walls of a besieged city and to set up a standard there.

MURAL DECORATION (from Lat. *muralis*, relating to a wall, from *murus*, OLat. *mœrus*, wall). Art applied to the adornment of wall surfaces. Wall painting in fresco, in oils, in encaustic; figured sculpture in low relief, colored or plain, in stone, marble, terra cotta, or stucco; mosaic compositions, marble incrustations, and sectile work, and wainscoting in

carved and paneled woodwork, are the principal modes used for the purpose. The term is commonly made to include also, by extension, the decorative treatment of vaults and ceilings, as well as walls. For details, consult the articles on the different varieties of mural decorations: Relief Sculpture; Inlay; Fresco; Mosaic; also the general articles Decorative Art; Interior Decoration.

Egypt. In ancient Egypt flat undecorated walls were avoided; the internal surfaces of the temples and the external surfaces of pylons and walls were converted into large grouped pictures, deeply incised, and with flat tints, graded according to the light, being delicate in the well-illuminated parts, heavier in the darker apartments. See Egyptian Art.

Asia. Babylonia and Assyria had greater variety of method. The walls were often divided horizontally into zones—a lower dado of sculpture, an upper one of painting. The sculpture was either of fine stone partly colored (not entirely, as in Egypt), or of glazed tiles in relief, strongly colored. Though the tones were still flat, more relief was given than in Egypt by the accentuation of outlines and details by heavy dark lines. Gold and other metals and rich hangings increased the strength of the color scheme. The exterior walls were often faced with flat glazed tiles in massed colors, with the same result. See Babylonian Art; Assyrian Art.

Greece. The pre-Hellenic Greeks seem to have used gypsum and plaster reliefs and wall paintings in similar fashion to the Assyrians, and the Greeks of the historic period at first show signs of Oriental influence in the bright colors applied to gable, frieze, and metope sculptures, without the Oriental appreciation of color harmony. The polychromy of Greek architecture and sculpture gradually, however, gave way to the use of plain sculpture and to a reliance on the play of light and shade by means of projecting moldings and members in place of pure surface decoration. Simplicity of method, reticence of style, plasticity of composition, and delicacy of coloring were their characteristics. Color was subordinated to form, and the decorated surfaces were broken up usually into small units. The predominance of external over internal effects helped to minimize the importance of Greek mural decoration. See Greek Art.

Rome. The Romans returned, with different methods and a different style, to the Oriental and Egyptian idea of colored instead of plastic mural adornment, which received great importance from their development of vast interiors. They adopted three principal media, with increasing heaviness as the Empire advanced—wall painting in fresco, mosaic painting, and marble incrustations. The molding of decorations in low relief in the stucco covering of walls and ceilings may be considered chiefly as an adjunct to the painted decoration. The most characteristic of these three treatments was the use of rich Oriental and African marbles. The interior walls of temples, Imperial thermæ and palaces, basilicas, and other buildings were covered to a considerable height in this way, while private houses were generally confined to fresco work. (See Plate of Pompeian Mural Decoration, under Decorative Art.) Mural decoration on stucco was often microscopic in scale, small compartments, and small scenes being juxtaposed without much central interest, and by attempts at perspective effects and different planes the effort was made to counteract the confining effect of the walls of a room; to substitute pictures one could look *into* for flat decorated surfaces. See Roman Art.

Early Christian. In early Christian and Byzantine mural decoration one school adopted as its main medium the new method of mosaic wall pictures (see Mosaic), which gave a richer mural color scheme than had ever been known in any style. Casting aside the Roman picturesqueness, this school returned to the Oriental flat effects; but with the addition of glowing gold grounds and the depth given by the colored glass cubes an entire wall often became a single picture instead of an agglomeration of units. The advantage of Byzantine decoration was that the eye was received by and sank into its rich mosaic surfaces instead of being thrown back by shallow fresco coloring. The other school preferred plain or frescoed surfaces; this treatment was common in most of Syria, Asia Minor, north Africa, and Europe. Mural decoration in these regions for long after the decline of Rome was practically extinct where Byzantine influence did not exist. Even in Byzantine art fresco painting tended in many places to displace mosaic. See Christian Art; Byzantine Art.

Mohammedan. The earliest special development of mediæval decoration was in the Mohammedan world, and it was one of great interest. It used color very generously, but also sculpture in low relief; its effects were mainly those of tapestry and other stuffs, even when design was in the form of colorless carvings on the outside surface of a dome. Geometric patterns were most prominent; floral forms, and very rarely human figures, characterize Persian art. Glazed tiles were specialties in Persia, geometric mosaics in Egypt, colored stuccoes in Spain. There was but little composition, grouping, or subdivision; the main plan was to cover the surfaces completely with more or less uniformity. There were practically no plain surfaces and no heavy projections. Such necessary projections as pendentives were broken up into minute stalactites. The effects were rich and restful, often even hypnotic. The Oriental races always retained the faculty of harmonious coloring, and used it to the full in mural decoration. Though related to the Byzantine type, this style was far more intricate and less well composed. See Mohammedan Art.

Mediæval. The mediæval decorative mural work in Europe did not begin to take shape until the close of the eleventh century; its usual media were extremely simple, merely fresco painting and sculpture in stone. The multiplicity of styles makes any unity of characterization, such as was possible in previous styles, quite impossible. During the Romanesque epoch polychromy of the walls was common and even large cycles of frescoes were often painted, especially in Germany. In central and southern France the entire exterior façades were often compositions in sculpture; in Tuscany and northern Italy effects of color on the exterior were given by the use of marbles, terra cotta, and brickwork in patterns or courses. In certain regions, such as Sicily, Rome, and Venice, the Byzantine and Oriental rich color scheme, especially in the form of mosaic work, prevailed. When, however, European art became thoroughly nationalized and indigenous

in the Gothic period, Italy took a decided lead in the development of painted mural decoration in fresco which superseded all other methods. The reason for this was that the more logical Gothic art of the North, under French leadership, practically suppressed wall surfaces, and consequently mural decoration, in favor of detached ornamentation in stone, stained glass, and the like, owing to the framework system of Gothic architecture. Italy, almost alone, did not abolish wall surfaces; consequently her painters, like Cimabue and Giotto and their contemporaries and successors, could develop the primitive fresco work of the Romanesque type into a really artistic scheme of mural decoration such as we see at Assisi, Florence, and Siena. Grand figured compositions, harmoniously grouped, were the characteristic of this Italian school. Rich borders sometimes followed, sometimes contrasted with, the architectural lines. Above all, the coloring was light and clear and the effects flat and symbolic, the figures being rather like silhouettes on a flat ground. Sometimes there were also grand exterior effects both of color and form, as at Orvieto. See ROMANESQUE ART; GOTHIC ART.

Renaissance. The Renaissance saw Italy still easily leading in mural decoration from Masaccio to Raphael; the media were even simpler than before, for mosaics were entirely discarded and effects of sculpture and architectural memberment less frequent. The climax in the Sistine Chapel and Raphael's Stanze was reached by a perfectly consistent series of steps, some advantageous, such as the abandonment of the heavy architectural frameworks of the Giottesque period for simpler borders; some were disadvantageous, such as the attempts to do away with flat effects by the introduction of perspective and a variety of planes in both environment and figures. The juggling with perspective and anatomical difficulties indulged in during the fifteenth century by Paolo Uccello, Melozzo, and Mantegna led, in later days, to the extravagances of Correggio, Paolo Veronese, and Tiepolo. It became the main object of painters of the sixteenth century to change the subdivisions of flat mural decoration into a series of realistic framed vistas, and this mistaken realism was emphasized by the use of oil instead of fresco colors, giving effects of atmospheric perspective besides the previously acquired linear perspective. See RENAISSANCE ART.

Modern. During the first half of the nineteenth century mural decoration declined to very low estate. In France, however, the influence of the national school of fine arts and the government patronage of the arts preserved it from extinction, and the domination of classicism and tradition began towards 1840 to yield to a new and fresher spirit, exemplified in the works of Hippolyte Flandrin. The decorative sense is more highly developed in France than elsewhere, and there has risen in France a remarkable school of mural painting, whose influence has been felt throughout the modern world. Modern French decorative painting rejects the flatness and conventional composition of the Italian fourteenth-century artists, inclining rather to the pictorial realism of the developed Renaissance schools; but it recognizes the difference between an easel picture applied to a wall or ceiling, and a decorative painting composed specially for an architectural setting. The most prominent representatives during the nineteenth century were Hippolyte Flandrin, whose austere religious paintings excel in line; Paul Baudry, decorator of the Grand Opera, a follower of the High Renaissance; and greatest and most original of all mural painters of the nineteenth century, Puvis de Chavannes, who reverted to the flat decorative effects of Giotto.

While Germany did much early in the century to study and revive mural painting, classical tradition tended to stifle originality, and no really great masters of the art have appeared. Cornelius (1783–1867) and Kaulbach (1805–74) made efforts to revive monumental mural painting, especially at Munich and Berlin, but their works lack the real decorative spirit. In England there is little to show in the way of mural painting, the preference there being usually for decoration by architectonic means and conventional ornament. The fine opportunity offered by the extensive frescoes of the Houses of Parliament failed to produce an art of true decorative worth. In Spain the eccentric but powerful genius of Goya (1746–1828) asserted itself in the first third of the last century in ceiling paintings of great merit in Madrid, but he had no successors, and Spain and Italy are equally in arrears in this branch of art. The pioneers of mural painting in the United States were John La Farge, whose important decorative work in Trinity Church, Boston, began in 1876, and William Morris Hunt, whose ceiling panels in the Assembly Hall of the New York State capitol were undertaken shortly afterward. The Columbian Exposition at Chicago in 1893 not only gave extensive opportunity for mural painting, but promoted an active public interest. The well-known achievements of Sargent and Abbey in the Boston Public Library followed shortly afterward. The widest opportunity was offered in the extensive decorations of the Congressional Library, Washington, in which many American painters and sculptors participated. These were followed by similar decorations in the Appellate Court Building, New York, and especially in the State capitols of Minnesota, Iowa, Wisconsin, and Pennsylvania, the Federal Building at Cleveland, and the Court House of Baltimore. Decorations of importance were also completed for many private residences in New York and elsewhere and in some of the churches, notably that of the Paulist Fathers in New York, the interior of which contains a cycle of important subjects painted chiefly by Edward Laurel Harris. Among the painters who have distinguished themselves in mural work are Kenyon Cox, Edwin H. Blashfield, H. O. Rogers, Robert Blum, John W. Alexander, and Violet Oakley; while others like Maitland Armstrong and Frederic Crowninshield have adapted themselves rather to the important decorative accessories than to the figure subjects of mural painting. Generally speaking, the productions of the American school are not lacking in technical ability, but are luxurious rather than austere in character and more suited to the ballrooms and salons of hotels and private houses than to the halls of justice, government, and learning.

Modern mural decoration has generally abandoned fresco painting in favor of oil painting on canvas, attached to the wall with white lead. Fresco, tempera, encaustic, and water-glass painting are rarely attempted. Other forms of decoration have been revived and are largely

used, wainscoting, marble incrustation, mosaic, and inlay and stucco relief, and wall hanging in paper, tapestry, stamped leather, and other materials, besides other more purely architectonic methods of adornment, being widely used and with conspicuous success.

Bibliography. No special works have been written upon the general subject, except practical manuals for the use of painters, such as Thomas, *Mural Decorations* (London, 1869); Crowninshield, *Mural Painting* (Boston, 1887); F. H. Jackson, *Mural Painting* (New York, 1904); J. D. Grace, *The Art of Color Decoration* (ib., 1913). For mural painting in America consult the monographs by Pauline King (Boston, 1902) and E. H. Blashfield (New York, 1913).

MURAL PAINTING. See MURAL DECORATION.

MURANO, mōō-rä'nō. A town in the Province of Venice, Italy, on an island in the Venetian lagoon, 1½ miles north of Venice (Map: Italy, G 2). It has the twelfth-century cathedral of San Donato, the basilica of St. Peter, the Martyr, with a painting by Bellini. The town has been, since the thirteenth century, the seat of the Venetian glass industry and contains a museum of glass products. It is a centre for the production of false jewels. Pop. (commune), 1901, 5150; 1911, 5805.

MURAT, mụ'rà', JOACHIM (1767–1815). A celebrated French cavalry leader, King of Naples from 1808 to 1815. He was born March 25, 1767, being the son of a well-to-do innkeeper at La-Bastide-Fortunière, near Cahors, in France. He was intended for the priesthood and commenced the study of theology and canon law at Toulouse, but soon enlisted in a cavalry regiment. Being dismissed for insubordination after two years of service, he returned to his home, and later proceeded to Paris, where he obtained admission into the constitutional guard of Louis XVI. On the outbreak of the Revolution he was made a sublieutenant in a cavalry regiment, and a little later aid-de-camp to General Hué. His gallantry and his extreme republicanism soon won him the rank of colonel. He served with distinction under Bonaparte in Italy and Egypt. He finally rose to be general of division (1799), and having returned with Bonaparte from Egypt to France, he rendered most important assistance on the 18th Brumaire, by dispersing the Council of Five Hundred at Saint-Cloud. Bonaparte now intrusted him with the command of the Consular Guard, and gave him his youngest sister, Caroline, in marriage (Jan. 20, 1800). The same year Murat commanded the cavalry at Marengo, and expelled the Neapolitans from the Papal States. In 1803 he was a member of the Corps Législatif, and in 1804 Governor of Paris. On the establishment of the Empire he was loaded with honors, being made a marshal of the Empire (1804), and Prince and Grand Admiral (1805). He continued to command the cavalry in the armies led by the Emperor, contributed to the triumph of the French at Austerlitz, and to other victories by his enthusiasm and commanding appearance as well as by his military talent. In 1806 the newly erected Grand Duchy of Berg (q.v.) was bestowed upon him. After the battle of Jena, in 1806, he led in the pursuit of the Prussians, and in 1807 he participated in the battles of Eylau and Friedland. In 1808 Napoleon placed him in command of the army in Spain, where in May he suppressed the insurrection in Madrid. Joseph Bonaparte having exchanged the throne of Naples for that of Spain, Murat was made his successor, and on Aug. 1, 1808, was proclaimed King of Naples under the title of Joachim I. He immediately took possession of the Kingdom of Naples, but the Bourbons, through the support of Great Britain, retained Sicily. Murat instituted a number of wise and beneficent reforms, but had to endure the yoke of Napoleon, who left him little but the outward show of royalty. In the Russian campaign of 1812 he commanded the cavalry, but after sharing in the disaster which befell the French army returned to Naples anxious and discontented. He joined the French army again in 1813, and distinguished himself at Dresden, but after the battle of Leipzig withdrew to his own dominions and concluded a treaty with Great Britain and Austria in January, 1814, by which he was guaranteed the possession of his throne on condition of joining the coalition against Napoleon and contributing 30,000 troops to the allied armies. After a pretense of attacking Eugène Beauharnais in Italy, Murat withdrew to Naples and entered into private communication with Napoleon at Elba. On the Emperor's return to France, Murat placed himself at the head of an army of 40,000 men and commenced a war against Austria. He was defeated by the Austrians at Tolentino, May 2–3. Naples was evacuated May 19, and Murat fled to the island of Ischia, and finally found his way to France, while his wife and children took refuge with the British fleet. Napoleon declined to treat with his brother-in-law on any terms and forbade his presence in Paris. Murat then found a refuge near London, and after Waterloo he fled to Corsica. Declining Metternich's offer of an asylum in Austria, he proceeded in a foolhardy manner with a few followers to the coast of Naples and proclaimed himself king and liberator, but was presently taken prisoner, and after trial by a court-martial was shot in a hall of the castle of Pizzo, Oct. 13, 1815.

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MURAT, NAPOLÉON ACHILLE (1801–47). Eldest son of Joachim Murat, King of Naples. He was born in Paris and for a time bore the title of the Prince Royal of the Two Sicilies; but after the overthrow of his father, in 1815, he sought refuge with his mother in Lower Austria, where he received an excellent education. In 1821 he emigrated to the United States, and after a tour of the country settled near Tallahassee, Fla., where he bought a large estate and built an elegant mansion. When Lafayette revisited the United States in 1825, Murat traveled much with him, and was by him introduced to a grandniece of Washington,

Miss Catharina Dudley, whom he married in 1826. Murat declined numerous offers of a political career, and devoted himself to farming, literary pursuits, and philanthropic undertakings. His literary works include: *Lettres d'un citoyen des Etats-Unis à un de ses amis d'Europe* (1830); *Esquisse morale et politique des Etats-Unis* (1832); *Exposition des principes du gouvernement républicain tel qu'il a été perfectionné en Amérique* (1833). These works attracted great attention in Europe. Consult MacConnell, "The Prince and Princess Achille Murat in Florida," in the *Century Magazine* (New York, 1893).

MURAT, Napoléon Lucien Charles, Prince (1803–78). The second son of Joachim Murat, King of Naples. He was born in Milan and after the overthrow of his father, in 1815, lived for several years with his mother in Lower Austria. In 1813 he had been made Prince of Ponte Corvo, but escaped to Boston in 1825, and soon after his arrival in the United States he joined his uncle Joseph, who was then living in Philadelphia under the title of the Count of Survilliers. In 1827 he married Miss Georgina Frazer, an heiress, of Bordentown, N. J. His wife later established there a fashionable school for young women. Unlike his brother, Napoléon Achille, he did not give up the idea of recovering his father's throne, and in 1839 and 1844 made trips to France with that purpose in view, but was permitted to remain in France only a short time. After the February revolution of 1848 he returned to France and was elected a deputy to the Constituent Assembly. He was Minister Plenipotentiary to Turin in 1849–50. After the coup d'état of Dec. 2, 1851, he received a seat in the Senate, and was recognized by Napoleon III as a prince of the Imperial family, which brought to him an annual pension of 150,000 francs and secured the payment of two millions of debts. In 1861 he advanced claims to the throne of Naples, but his pretensions were officially disavowed by the French government and came to naught.

MURATORE, mu'rà'tôr', Lucien (1878–). A French dramatic tenor. He was born at Marseilles, graduated from the conservatory of his native city in 1897, and later studied in Paris. He appeared with Calvé and Dufresne in *La Carmélite* at the Opéra Comique in Paris, where he also sang in *Muguette* and *Le cor fleuri*, and at the Opéra he appeared in *Ariane* and *La Catalane*. Besides singing the rôles of Faust, Romeo, and Walther, he created the leading parts in *Bacchus*, *Le miracle*, *Salome*, *Siberia*, and *Francesca da Rimini*. During the seasons of 1912–13, 1913–14, and 1915–16 he was a member of the Chicago Grand Opera Company.

MURATORI, mōō'rà-tō'rê, Lodovico Antonio (1672–1750). A celebrated Italian antiquary and historian. He was born at Vignola, near Modena, Oct. 21, 1672. He studied theology and history in the University of Modena and early attracted the attention and won the friendship of Father Bacchini, the librarian at the ducal palace, who fostered in him a taste for historical and antiquarian research. In 1688 Muratori took minor orders, and in 1694 obtained the degree of doctor in canon and civil law. The same year he was appointed to the staff of the Ambrosian Library at Milan. While there he published his two collections of previously unedited Greek and Latin fragments entitled *Anecdota Græca* and *Anecdota Latina* and some poems and essays of a purely literary character: *Della perfetta poesia italiana* (Modena, 1706) and *Riflessioni sopra il buon gusto nella scienze e nelle arti* (Venice, 1708). In 1700 he returned to Modena at the invitation of the Duke, in order to become keeper of the ducal archives and librarian of the Este Library. From 1708 to 1712 he wrote several polemical works in which he defended the right of the Empire to certain Italian territory claimed by the papacy, and was attacked on general lines by the Jesuits for preaching heretical doctrines. From 1714 to 1716 he was commissioned by the Duke of Modena to collect material relating to the history of the duchy which he published as *Antichità estensi* (2 vols., 1717–40). This work led him to undertake the project of collecting similar materials for Italy as a whole from the fifth to the sixteenth century, which extended over 15 years and appeared as *Rerum Italicarum Scriptores* (25 vols., 1723–51), to which he added a series of historical dissertations, *Antiquitates Italicæ Medii Ævi* (6 vols., 1738–42). Consult: the biography by his nephew, G. F. Muratori, *Vita del celebre Lodovico Antonio Muratori* (Venice, 1756); Troya, *Studi intorno agli annali d'Italia del Muratori* (Naples, 1877; new ed., 1901 et seq.). His letters were published by Lazzari (Venice, 1783). Consult also bibliography in Hauck-Herzog, *Realencyclopædie für protestantische Theologie*, vol. xiii (3d ed., Leipzig, 1903).

MU'RATO'RIAN FRAGMENT, or Canon of Muratori. A fragment of a treatise upon the Bible canon containing 85 lines and commenting upon the several books and so giving a very important list of the books accepted as canonical in Italy at the time of its composition, which probably was the latter half of the second century. In the list are the Gospel of Luke, which it calls the third (the fragment begins at this point, so doubtless Matthew and Mark had been mentioned in the part now lost); John, Acts, the Epistles of Paul to the Corinthians, Ephesians, Philippians, Colossians, Galatians, Thessalonians, Romans, Philemon, Titus, and Timothy; Revelation of John; Jude; two Epistles of John; Wisdom of Solomon; and, as doubtful, the Revelation of Peter, but omits the Epistles of James and of Peter and the Epistle to the Hebrews. The fragment was discovered in the Ambrosian Library at Milan (1740) by Lodovico Antonio Muratori (q.v.), from whom it receives its name. It is translated in the *Ante-Nicene Fathers*, vol. v. For the text and its translation, consult Tregelles, *Canon Muritorianus* (Oxford, 1867); B. F. Westcott, *History of the Canon* (6th ed., London, 1889); H. M. Gwatkin, *Selections from Early Christian Writers* (New York, 1893); J. C. Ayer, *A Source Book for Ancient Church History* (ib., 1913).

MURAVIEV, mōō'rà-vyĕf'. An ancient and distinguished Russian family, originally of Moscow, which in 1488 was presented by Czar Ivan Vasilievitch with large estates in the Province of Novgorod. The best-known members of the family are: Mikhail Nikititch (1757–1807). Catharine II made him the tutor of her grandchildren, Alexander and Konstantin, for whom he composed works in prose and poetry. He also occupied various important administrative posts. His works were published in three volumes (Moscow, 1810). — Nikolai Nikolaie-

VITCH (1768–1840). He studied at Strassburg, and thereafter served for some time in the army and navy. In 1797 he founded a private institution for officers of the general staff. During the War of 1812–14 against Napoleon he served as colonel. His school became a state institution in 1816, and he continued to superintend it until 1823, after which he devoted himself to agriculture.—ALEXANDER NIKOLAIEVITCH (1792–1864). He was the eldest son of the preceding, and was prominent in the Decembrist uprising, which broke out in 1825 at the accession of Nicholas I. In consideration of his father's services his life was spared and he was exiled to Siberia. Later he was permitted to return, and during the Crimean War he entered the army and became a major general.—NIKOLAI NIKOLAIEVITCH (c.1794–1866). The brother of the preceding. He entered the army in 1810 and took part in the campaigns of 1812–14 against the French. After the end of the war he remained in the army, and traveled extensively in Asia. He served during the Persian War and was made a major general. In 1830 the Polish Rebellion broke out, and Muraviev was called in to aid in suppressing the revolt. In 1832 he was sent to Egypt to treat with Mehemet Ali for the conclusion of peace with Turkey. He then took charge of the Russian forces dispatched to the Bosporus to aid the Sultan against Mehemet Ali. In 1838 he fell into disgrace and retired from the army, remaining inactive until 1848. During the Crimean War he rendered valuable service to Russia in the Caucasus. The capture of Kars, in November, 1855, earned for Muraviev the title of prince and other great honors.—MIKHAIL NIKOLAIEVITCH (c.1796–1866). A brother of the preceding. He entered the army and participated in the campaigns against France of 1812–13. He took an active part in the uprising of the Decembrists and was imprisoned for five months. Afterward he reentered the military service and soon occupied a prominent place among the Russian statesmen of the time. He occupied many important administrative positions, and opposed vehemently the emancipation of the serfs. During the Polish Rebellion of 1863 he was sent to Vilna, and acted with such relentless rigor that in a few months the entire insurrection was suppressed. His acts of cruelty made his name infamous throughout Europe.—MIKHAIL NIKOLAIEVITCH, COUNT (1845–1900). A grandson of the preceding. He was born April 19, 1845, studied in Heidelberg, and in 1864 entered the service of the Ministry of Foreign Affairs. He was attached to various Russian embassies in Europe, and on the death of Prince Lobanov in 1897 he became Minister of Foreign Affairs. He advanced Russian interests in the Far East and put forth the Czar's note for The Hague Peace Conference in 1898. He died June 21, 1900.

About 1730 a member of the Muraviev family married a daughter of Apostol, the Ataman of the Cossacks, whose name was added to his own. Of this branch of the family the best known is SERGEI MURAVIEV-APOSTOL (1796–1826). He participated in the Decembrist uprising of 1825, proclaimed Grand Duke Konstantin as Emperor, and seized the town of Vasilkov. Troops were sent against him and he was captured, taken to St. Petersburg, and hanged July 25, 1826.

NIKOLAI NIKOLAIEVITCH, COUNT MURAVIEV-AMURSKI (c.1809–81), belonged to another branch of this family. He entered the army while young, and served in the Caucasus, where he attained the rank of major general. In 1848 he was appointed Governor-General of eastern Siberia, and gained for Russia the entire territory of the Amur, and concluded the Treaty of Aigun, May 28, 1858, by which this country was definitely ceded by China. His services were rewarded by the title of Count, and he received the name Amurski. In the summer of 1859 he went with twelve ships to Yeddo, and concluded a favorable treaty with Japan. He resigned his governorship in 1861, and was made a member of the Imperial Council.—NIKOLAI VALERIANOVITCH (1850–1908), a nephew of Muraviev-Amurski, received his education in a military academy, the Third Classical College of Moscow, and the law school of Moscow University. After taking his degree in 1870, he was appointed assistant district attorney for the city of Moscow. By rapid advancement he became Minister of Justice in 1894. While serving as Imperial Secretary, he had taken an active part in revising and codifying the Russian law, and in his new office he carried out a reform of the courts and brought the prisons, formerly in the police jurisdiction, under the control of his department. In 1903 he was chairman of The Hague Tribunal which passed on the Venezuela claims matter, and from 1905 to his death he was the Russian Ambassador to Italy. Nikolai Valerianovitch also became known as a philanthropist and as the author of many important articles on legal subjects.

MURCAY, MARIE MARGUERITE LE VALOIS DE VILLETTE DE. See CAYLUS, M. M.

MURCHISON, mûr'chĭ-son, CHARLES (1830–79). A British physician, born in the island of Jamaica. He was educated at the universities of Aberdeen, Edinburgh, Dublin, and Paris. In 1853 he entered the East India Company's military service, but soon after reaching India was appointed professor of chemistry at the Calcutta Medical College. In 1855 he published two valuable papers on *The Climate and Diseases of Burmah.* The same year he returned to Europe, and settled in London, where he was connected with a number of the leading hospitals. He was not only an authority on tropical fevers, but also an able geologist. He published over 300 articles. Among his works are *Clinical Lectures on Diseases of the Liver, Jaundice, and Abdominal Dropsy* (1868; 3d ed., 1885; Fr. and Ger. trans.); *Treatise on the Continued Fevers of Great Britain* (1862; 3d ed., 1884; Fr. and Ger. trans.), a very important work, although he opposed the bacterial theory of infection; *Functional Derangements of the Liver* (1874; 3d ed., 1885).

MURCHISON, SIR RODERICK IMPEY (1792–1871). A British geologist, born in Tarradale, Ross. After studying at the military college of Marlow, he entered the army and served as an officer in the Peninsular War under Wellington. Through the advice of Sir Humphry Davy he was induced to take up the study of science, and in 1825 became a fellow of the Geological Society of London, before which he read a paper entitled "Geological Sketch of the Northwestern Extremity of Sussex and the Adjoining Parts of Hants and Surrey." Returning from a geological tour through France, which he made in the company of Sir Charles Lyell, he undertook a systematic exploration and study of the lower

fossiliferous strata of England and Wales. This work engaged his attention for many years and resulted in a reclassification of the Paleozoic rocks, with the introduction of a new system to which, in 1835, he gave the name Silurian. In coöperation with Sedgwick, with whom later he was to become involved in a bitter controversy over the so-called Cambrian question, he established the existence of a group of strata between the Silurian and the Carboniferous which was named the Devonian system. He was soon after employed by Emperor Nicholas in a geological survey of Russia, being associated with De Verneuil and Keyserling; during the years 1840–44 he explored a large part of southern Russia and introduced another new system—the Permian—into the geological time scale. From his knowledge of the geological structure of the Ural Mountains and the Australian systems, he was led to believe that gold occurred in the latter, and as early as 1844 predicted its discovery. Murchison was elected president of the British Association for the Advancement of Science in 1846, president of the Royal Geographical Society in 1844, 1845, and 1857, and in 1855, upon the death of Sir H. T. De la Beche, became director of the British Geological Survey. He was knighted in 1846, made Knight Commander of the Bath in 1853, and a Baronet in 1863. From the Emperor of Russia he received the grand cross of St. Anna and that of St. Stanislas. The greater portion of his contributions to science were published in the society journals. Among his principal works are: *Geology of Cheltenham* (1834); *The Silurian System* (1839); *On the Geological Structure of the Northern and Central Regions of Russia in Europe* (1841); and *Geology of Russia in Europe and the Ural Mountains* (1845). Consult Geikie, *Life of Sir Roderick I. Murchison* (London, 1875).

MUR'CHISO'NIA (Neo-Lat., named in honor of Sir R. I. Murchison). An extinct gastropod of the family Pleurotomariidæ, found in rocks of Ordovician to Triassic age, and especially common in the Devonian and Carboniferous formations. The shell has a more or less pointed spire consisting of numerous coils or whorls. The aperture has in its outer lip a slit like that of *Pleurotomaria*, and a corresponding slit band that forms a more or less pronounced ridge on the outside of the whorls all the way from the aperture to the apex of the shell. The earlier species as a rule have smooth-surfaced shells; the later species are more frequently ornamented by nodes and transverse ridges. A subgenus, *Hormotoma*, with rounded whorls, is represented by *Murchisonia gracilis*, a very common species in the Trenton limestone of the United States and Canada. *Loxoplocus*, another very peculiar genus, with the coils of the spire unrolled and somewhat carinate in section, lived in the cavities of the corals that made up the Guelph beds of Canada and western New York. See PLEUROTOMARIA.

MURCIA, mōōr'thē-ȧ. A former division and an old Moorish Kingdom of Spain, situated in the southeastern part of the country and bounded on the north by New Castile, on the east by the former Kingdom of Valencia, on the south by the Mediterranean Sea, and on the west by the former kingdoms of Granada and Jaén and by New Castile (Map: Spain, E 4). The division comprised the modern Province of Murcia, the greater part of Albacete, and small portions of Jaén and Alicante, with a total area of about 10,000 square miles.

The surface of Murcia partakes of the general character of the whole peninsula—the interior plateau, the rapid and mountainous slope towards the sea, and the low coastal region. The last is a sandy semiarid belt from 10 to 20 miles wide, and broken by several coast lagoons, of which the Mar Menor is the largest. The mountainous belt occupies the greater part of the division, and consists of an irregular system of ranges whose nucleus and highest point is the Sierra de Espuña, with an altitude of 5193 feet. North of the mountains the interior plateau forms a part of La Mancha, a deforested and almost arid plain. The principal water system is the Segura River with its tributaries, which are used only for irrigation and are subject to great variations in volume, being at some seasons almost dry and at other times subject to disastrous inundations. The climate is subtropical near the coast and temperate on the slopes and plateaus. The winters are mild, the sky nearly always clear, and the climate is pleasant and healthful; but the rainfall is insufficient for the needs of agriculture. The whole region has been almost entirely deforested, and agriculture can be carried on only in the valleys by means of irrigation. Many of the valleys, however, are well cultivated, especially the Huerta, or Garden, of Murcia, which is one of the most beautiful places in Spain. The chief agricultural products are wheat, barley, and flax. Oranges, lemons, olives, grapes, and hemp are grown in the south. Mining is an important industry, producing iron, lead, zinc, copper, and sulphur. Other industries are silk manufactures and the plaiting of articles of esparto grass. The population in 1900 was 577,987 and, in 1910, 615,105. The chief city is Murcia (q.v.).

Murcia was the centre of the Carthaginian colonies in Spain. It was conquered by the Saracens early in the eighth century and by them called Todmir. It formed a province of the Caliphate of Córdoba, after whose dissolution, in the early part of the eleventh century, it became an independent Moorish kingdom. About the middle of the thirteenth century it was conquered by Castile.

MURCIA. The capital of the Province of Murcia in southeast Spain. It lies on both banks of the Segura River, in the beautiful valley known as the Huerta, or Garden, of Murcia (Map: Spain, E 4). This valley rivals in the luxuriance of its vegetation the famous Vega of Granada. It was carefully irrigated by the Moors, and is covered with vineyards and groves of mulberry, olive, and fig trees. The city itself has broad streets and a clean and generally neat appearance. Several promenades and pleasure grounds have been laid out along the embankments of the river, and the Paseo de Floridablanca is a wide avenue with fine rows of plane trees. Though the city still retains some of its old Moorish atmosphere and a few typically narrow streets, with balconied houses, it has preserved but few objects of interest. The only building which attracts considerable notice is the cathedral, a Gothic-Romanesque structure begun in the fourteenth century. Its façade in the baroque style dates from the eighteenth century, and its tower, the most interesting feature, was begun in 1522 and com-

pleted in 1766. Other prominent buildings are the imposing bishop's palace, the city hall, with a monumental façade, the Colegio de San Fulgencio, two theatres, a bull ring, the Moorish Alhondiga or granary, and the large and well-built silk factories. There are a provincial museum, two normal schools, and a secondary school. The industries are largely derived from the surrounding huerta, the chief being the silk industry, which, with grain and fruit raising, furnishes the principal articles of trade. There are also manufactures of woolen goods, gunpowder, soap, leather, hats, and musical instruments. The city has had a long and interesting history under Romans, Moors, and Spaniards. Pop., 1900, 111,693; 1910, 125,057.

MUR'DER (AS. *morþor, morþur,* from *morþ,* OHG. *mord,* Ger. Mord, death; connected with Welsh *marw,* Lith. *smertis,* Lat. *mors,* death, Gk. *βροτός, brotos,* mortal, Skt. *mar,* to die). The unlawful killing of a human being with malice aforethought. The term appears to have been limited in early English law to a homicide committed in secret or accompanied by concealment of the body. During the Norman period, this *morth* (or secret) slaying of Saxon times became the *murdrum*—the homicide of the very worst kind, and was distinguished by Glanville from a mere *homicidium,* or open killing. For a considerable time *murdrum* signified the fine imposed by the crown on any hundred in which a man was slain, as well as the killing itself. This fine—originally 46 marks, of which 40 went to the King and 6 to the kinsfolk of the deceased—could be avoided by the production of the slayer, or by proof that the slain man was an Englishman and not of Franco-Norman race. Furnishing such proof was known as Englishry. From the time that Englishry was abolished in 1348 murder bears the single meaning of unlawful homicide of the worst species, which subjects the slayer to capital punishment.

The next step in the history of murder as a term of English law "consists in the adoption of 'malice aforethought' as the characteristic specific distinction of murder as distinguished from other kinds of homicide." This came about from the forms of the special findings of the jury in prosecutions for homicide. In order to entitle the slayer to a pardon under the Statute of Gloucester (6 Edw. I, c. 9, 1278 A.D.) it was necessary for the jury to find that he acted "in self-defense and not by felony or of malice aforethought." During the next two and a half centuries the modern distinction between willful murder and manslaughter (q.v.) was developed, as appears by a statute of 1531 (23 Hen. VIII, c. 1, § 3), which takes away the benefit of clergy (q.v.) in cases of "willful murder of malice prepense."

The first element in the crime of murder is unlawfulness, as distinguished from the killing which is justifiable or excusable homicide. (See HOMICIDE.) Not only must the killing be unlawful, but the person killed must be a "reasonable creature in being." Accordingly, the killing of an unborn child is not murder at common law, but the crime of abortion (q.v.). The other essential element in murder is the malice aforethought with which the killing is done. This requires, first of all, sanity and discretion on the part of the slayer. An idiot, a lunatic, or an infant below the age of discretion cannot commit murder. While malice aforethought is essential to the crime of murder, the law does not require the lapse of any prescribed time between the formation of the intention to kill and the killing. It is sufficient that the murderous intention precedes and accompanies the act of homicide. If the will accompanies the act a moment antecedent to the act itself which causes death, this makes the offense murder as certainly as if a day intervened between the willing and the doing. The malice in case of murder must be actual, or, as it is sometimes said, express, in contradistinction to implied malice. This does not mean, however, that the slayer must actually have intended to kill his victim, nor that he bore towards him a settled and malignant ill will. Hence if one shoots at A and misses him, but kills B, this is murder, because of the previous felonious intent, which the law transfers from one to the other. So if one lays poison for A, and B, against whom the poisoner had no felonious intent, takes it and is killed, this is murder. In short, the idea of malice aforethought is not spite or malevolence to the deceased in particular, but evil design in general; not so much premeditated personal hatred or revenge towards the person killed as a deliberately unlawful purpose which, if persevered in, must produce mischief. At the common law the procuring of a person to commit suicide (q.v.) is murder if the suicide is accomplished. So it is said in the books that if two persons agree to commit suicide and attempt to carry their design into execution, but only one dies, the survivor is guilty of murder if he were present at the commission of the suicide; otherwise he is an accessory before the fact.

The common law knew nothing of degrees of murder. If the homicide was committed unlawfully and with malice aforethought, the slayer was a murderer and, upon conviction, liable to capital punishment. This penalty has been thought too severe for some kinds of murder, and a number of the United States have divided the offense into two degrees, continuing capital punishment for the first degree and punishing the second degree with imprisonment. While these statutes differ in detail, they agree in limiting the definition of murder in the first degree to those cases where the killing was done in a willful, deliberate, premeditated, or particularly cruel manner or while engaged in the commission of some heinous felony, such as arson, and in some States rape and burglary. Consult: J. F. Stephen, *History of the Criminal Law of England* (3 vols., London, 1883); J. P. Bishop, *New Commentaries on the Criminal Law* (Chicago, 1892); F. Wharton, *Criminal Law* (Philadelphia, 1896); Clark and Marshall, *Law of Crimes* (St. Paul, 1900); and authorities referred to under CRIMINAL LAW.

MURDERER'S BIBLE. See BIBLE, CURIOUS EDITIONS OF.

MURDERS IN THE RUE MORGUE, THE. A tale by Edgar A. Poe which appeared in *Graham's Magazine* in 1841 and became a model for later detective stories.

MUR'DOCH, JAMES EDWARD (1811–93). An American actor, born in Philadelphia. His first appearance on the stage was in his native city in 1829. In 1833 he acted with Fanny Kemble during her tour in America and in 1856 played with some success at the Haymarket Theatre in London. During the Civil War in America he devoted himself to caring for sick and wounded soldiers and gave popular readings for the benefit of the United States Sanitary Commis-

sion. Subsequently he was professor of elocution in the Cincinnati College of Music. Joseph Jefferson characterized his acting as "not only extremely versatile, but entirely original." His greatest successes were in comedy and lighter tragedy. With William Russell he published *Orthophony, or Culture of the Voice* (1845) and *The Stage* (1880).

MUR'DOCK, James (1776–1856). An American scholar, born at Westbrook, Conn., and educated at Yale, class of 1797. He taught school in New Haven and at Oneida Academy, now Hamilton College, studied for the ministry, was licensed in 1801, preached for 13 years in the Congregational church of Princeton, Mass., and was professor of ancient languages in the University of Vermont from 1815 until 1819, when he went to Andover Theological Seminary. There he taught sacred rhetoric and Church history until 1829, and then he removed to New Haven, where he devoted his last years to private study. He published versions of Münscher's *Elements of Dogmatic History* (1830), of Mosheim's *Institutes of Ecclesiastical History* (1832), and of Mosheim's *Affairs of the Christians before the Time of Constantine the Great* (1852); a *Literal Translation of the Whole New Testament from the Ancient Syriac Version* (1851); *Sketches of Modern Philosophy* (1842).

MURDOCK, Joseph Ballard (1851–). An American naval officer, born at Hartford, Conn. In 1870 he graduated from the United States Naval Academy, then served on the North and South Atlantic stations and on the Coast Survey, was instructor in physics at the Naval Academy in 1880–83, and was executive officer of the *Panther* during the Spanish-American War. Murdock became commander in 1901, captain in 1906, and rear admiral in 1909. He commanded the *Rhode Island* in the cruise around the world in 1907–09, was commandant of the New York Navy Yard in 1909–10, and served as commander of the second division of the Atlantic fleet in 1910–11 and as commander in chief of the Asiatic fleet in 1911–12. In 1913 he was retired. He published *Notes on Electricity and Magnetism* (1884).

MURDOCK, Victor (1871–). An American legislator. He was born at Burlingame, Kans., and was educated in the public schools and at Lewis Academy, Wichita. After having gained experience in newspaper work in Chicago from 1891 to 1893, he was from 1894 to 1903 managing editor of the Wichita *Daily Eagle*. In 1895–97 he was also clerk of the Kansas Appellate Court. Elected as a Republican to the Fifty-eighth Congress in 1903 to fill the unexpired term of C. I. Long, he retained his seat through successive reëlections until March, 1915. Murdock was one of the leading insurgents in his party during the Taft administration, taking an active part in the overthrow of Speaker Cannon in 1910 and in 1912 breaking away to identify himself prominently with the new Progressive party. He was nominated for Speaker of the House in 1913. The next year he was the choice of Kansas Progressives for United States Senator, but was defeated by Charles Curtis, Republican. In a referendum to the national committee of the Progressive party (1915) Murdock was elected to succeed Senator Joseph M. Dixon as chairman of the committee.

MURDOCK, William (1754–1839). An English engineer, who was the first to employ coal gas as an illuminant. He was born at Bellow Mill, Ayrshire. Working as the assistant and coadjutor of James Watt, he became superintendent of construction and erecting engineer for that famous inventor. In 1784 he made a working model of a locomotive engine which had a flue boiler and single cylinder and was capable of a speed of from 6 to 8 miles an hour. He did not develop the idea, however, on a large scale, and about 1792 he turned his attention from engines to lighting by coal gas. (See Gas, Illuminating.) The actual perfection of this invention was attained probably two or three years afterward, and in 1802 gas was used in the illumination of Soho, London, after the news of the Peace of Amiens. Murdock made several improvements on Watt's steam engine, especially in the valve gear, and invented an independent or rotary engine and various apparatuses by which compressed air might be used, including its use for operating machinery, and was the first to use it for sending packages through tubes.

MURE, mūr, Sir William (1594–1657). A Scottish poet, born probably in Ayrshire, where the Rowallan estate, which he inherited, was situated. In 1643 he was a member of Parliament in Edinburgh, and he was wounded the next year at Marston Moor. His principal effort is his clever but somewhat heavy *True Crucifixe for True Catholikes*, which appeared in 1629. His other writings are a poetical translation (1628) of *Hecatombe Christiana*, a Latin poem by Boyd of Trochrig, many miscellaneous poems, and a paraphrase of the Psalms (1639). His *Historie and Descent of the House of Rowallane*, edited by W. Mure, 1825, is quaint and valuable.

MURE, William (1799–1860). A Scottish classical scholar, born at Caldwell, Ayrshire. After studying at Westminster School and at Edinburgh, he spent several years at the University of Bonn. His chief work, *A Critical History of the Language and Literature of Ancient Greece* (5 vols., 1850–57), was left unfinished, but the several portions of it on the epic and lyric poets and the historians may be regarded as separate works. His attempt in the first two volumes to prove the essential unity of the *Iliad* and the *Odyssey* and the identity of their authorship won him a wide reputation among European scholars. His treatment of Xenophon (q.v.), also, has been much admired. In addition to numerous contributions to the *Edinburgh Review*, his publications include: *Brief Remarks on the Chronology of the Egyptian Dynasties* (1829); *A Dissertation on the Calendar and Zodiac of Ancient Egypt* (1832); and his *Journal of a Tour in Greece and the Ionian Islands* (1842). He sat in Parliament for Renfrewshire in 1846–55 and was lord rector of the University of Glasgow in 1847–48.

MUREAU, Baron Milet de. See Milet de Mureau, L. M. A. D.

MURET, mụ'rā', or **MURE'TUS,** Marc Antoine (1526–85). A French humanist. He was born at Muret, near Limoges, became a proficient scholar in Greek and Latin, and when but 18 lectured in the College of Auch. Between 1544 and 1559 he taught Latin at Villeneuve, Bordeaux, and Paris. At the invitation of Cardinal Ippolito d'Este, he took up his residence in Rome, where he won fame by his lectures (1559). He took orders in 1576 and in 1584 retired from his professoriate. He wrote *Orationes* and *Epistolæ*, and his *Variarum Lec-*

tionum Libri XIX is still valuable. He edited also several Latin authors. His reputation rests chiefly, however, upon the classic Latinity of his style. The best edition of his collected works is that of Frotscher and Koch (Leipzig, 1834–41). Consult J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

MU'REX (Lat., purple fish). A genus of tropical shells, large, heavy, and variously armed with stout spines, processes, or knobs. These are to protect and strengthen the shells, for the animals live on exposed coasts. One species (*Murex pomum*) is found along the American coast from Cape Hatteras to Texas. It is from 2 to 3 inches in length, but not so conspicuously spiny as some more tropical forms. Allied to *Murex* is the oyster drill (*Urosalpinx cinerea*), which bores into oyster shells by means of its lingual ribbon. (See DRILL.) *Murex fortispina* of New Caledonia is furnished with a powerful tooth at the lower part of its outer lip. Its favorite food is *Arca pilosa*, a species of bivalve allied to the Noah's ark (see ARK SHELL), which lives half buried in coral refuse. Many of the tropical species are gayly colored, and some yield, when the animal is crushed, a rich violet-purple liquid which will act as a permanent stain and which furnished to the ancients their royal-purple dyes. Other shells yield this or a similar color. See PURPLE SHELL; also Colored Plate of GASTROPODS.

MUREX'IDE (from Lat. *murex*, purple fish), AMMONIUM HYDROGEN PURPURATE, or ROMAN PURPLE, $C_8H_4N_5O_6.NH_4$, H_2O. A beautiful coloring matter similar to the Tyrian purple of the ancients, which was made from a species of *Murex*—hence its name. Schele in 1776 obtained a red precipitate on evaporating to dryness a solution of uric acid in nitric acid. This reaction still forms the basis of the well-known murexide test for uric acid and related compounds. As uric acid exists in abundance in guano, that material has been found one of the best sources from which to obtain murexide. According to Prout, 1818, and Liebig and Wöhler, 1838, murexide is best obtained by oxidizing uric acid with nitric acid and after evaporating for some time at a temperature a little short of boiling, while still hot, adding a slight excess of ammonia. Two compounds are formed by this process, alloxan and alloxantin, and their reaction on each other results in the formation of the beautiful minute green metallic-lustred crystals of murexide, which, in combination with some of the compounds of lead and mercury, yield most brilliant red and purple dyes. The use of murexide was becoming extensive until the discovery of the aniline colors, the greater brilliancy of which has checked its employment. The acid combined in murexide, viz., purpuric acid, $C_8H_4N_5O_6H$, is not known in the free state. See URIC ACID.

MURFREE, mûr'frē, MARY NOAILLES (1850–1922). An American novelist, born in Murfreesboro, Tenn., best known by the pseudonym of Charles Egbert Craddock. She early devoted herself to reading and literary work, partly because of a lameness which barred her, even as a child, from physical activity. Choosing as her field the mountain regions of Tennessee and the people who dwelt there, Miss Murfree treated both with a freshness and fidelity born of a keen perception of, and a complete familiarity with, what was typical and appealing in them. Her work assures her an honored place among the Southern writers of her generation. Her writings include: *In the Tennessee Mountains* (1884); *The Prophet of the Great Smoky Mountains* (1885); *In the "Stranger People's" Country* (1891); *The Phantoms of the Foot-Bridge* (1895); *The Mystery of White-Face Mountain, and Other Stories* (1895); *The Young Mountaineers* (1897); *The Bushwhackers, and Other Stories* (1899); *A Spectre of Power* (1903); *The Frontiersman* (1905); *Storm Centre* (1905); *The Amulet* (1906); *The Windfall* (1907); *The Fair Mississippian* (1908); *The Raid of the Guerilla* (1912); *The Story of Duciehurst* (1914).

MUR'FREESBORO. A city and the county seat of Pike Co., Ark., 45 miles southwest of Hot Springs, on the Little Missouri River and on the Memphis, Dallas, and Gulf Railroad (Map: Arkansas, B 3). It is in a rich farming and fruit-growing region, noted particularly for its fine peaches, and there are also saw mills. Many mineral deposits are found. The largest diamond mine in active operation in the United States is located 2 miles south of Murfreesboro. Pop., 1910, 516.

MURFREESBORO. A city and the county seat of Rutherford Co., Tenn., 33 miles southeast of Nashville, on the Nashville, Chattanooga, and St. Louis Railroad (Map: Tennessee, D 3). It is the seat of Soule Female College (Methodist Episcopal, South), opened in 1852, of the Mooney School, established in 1901, the Middle Tennessee State Normal School, and the Tennessee College for Young Ladies (Baptist), established in 1906. The city has manufactures of flour, lumber, cedar ware, leather, carriages, cotton gins, machine-shop products, etc., and carries on a trade in cotton, mules, and cattle. Near the city is the Stone River battlefield (see STONE RIVER, BATTLE OF), the site of a national cemetery with 6150 graves, 2333 of unknown dead. Murfreesboro was incorporated in 1817. From 1819 to 1825 it was the State capital. The commission form of government went into effect in January, 1915. Pop., 1900, 3999; 1910, 4679.

MURFREESBORO, BATTLE OF. See STONE RIVER, BATTLE OF.

MURGER, mŭr'zhā', HENRI (1822–61). A French novelist and poet, born in Paris, March 24, 1822, who made attractive to his readers the irresponsible life of artists and students in Paris. Among his works are: *Scènes de la vie de Bohême* (1848); *Scènes de la vie de jeunesse* (1851); *Les buveurs d'eau* (1854); *Madame Olympe* (1859); other prose tales; and the poems *Les nuits d'hiver* (1861). In 1849, in collaboration with Théodore Barrière, the novel *Scènes de la vie de Bohême* was dramatized and played at the *Théâtre des Variétés* under the name of *La vie de Bohême*. The opera *La Bohême*, music by *Puccini*, 1898, is based upon that drama. To Murger, if to any one writer, literature perhaps owes the word Bohemia, signifying, not a geographical spot, but a moral condition. Murger left some classic tales and songs of dissolute thriftlessness and literary impecuniosity that have deluded a generation into looking back with dreamy regret on the sordid follies of their student days. The first Romantic generation, that of Gautier, had real enthusiasm, the ardor and fervor of renascence, for which Murger's whimsical hysteria of merri-

ment and his vicious sentimentality are but a poor substitute. Murger was trained for the law, became for a time secretary of Count Leo Tolstoy, but like that earlier Bohemian, Villon, he chose dissipation rather than decency. He died in a charity hospital in Paris, Jan. 28, 1861. A monument was recently erected to his memory, not without protest. Several of Murger's songs are translated by Andrew Lang in *Ballads and Lyrics of Old France* (London, 1872). Estimates of Murger by fellow Bohemians may be found in *Les nuits d'hiver* (Paris, 1862).

MURGHAB, mo͝or-gäb′. A river of Central Asia, rising in the Paropamisus Mountains, on the north boundary of Afghanistan (Map: Afghanistan, K 4). It flows northwestward into Russian Turkestan, in the Merv Oasis it is flanked by a network of canals for irrigation, and after a course of 366 miles is lost in the sands and marshes of the desert about 150 miles below Merv.

MURIAT'IC ACID. See HYDROCHLORIC ACID.

MU'RIDÆ (Neo-Lat. nom. pl., from Lat. *mus,* Gk. *μῦς, mys,* mouse). The family of rats and mice, typified by the house mouse (*Mus musculus*). It embraces in its 76 genera (Thomas) more than a third of all the rodents, is world-wide in its distribution, and includes many species of great importance to man, as pests or otherwise. The family has been monographed by Oldfield Thomas in the *Proceedings of the Zoölogical Society of London* (London, 1881). Consult also authorities cited under RODENTIA; and see GERBIL; HAMSTER; MOUSE; MUSKRAT; RAT; VOLE; WATER RAT; and similar titles.

MURILLO, mo͝o-rēl′yō, BARTOLOMÉ ESTEBAN (1617–82). A Spanish religious and genre painter, one of the chief masters of the school of Seville. He was born in Seville, the last week of December, 1617. Very little is known of his early life except that he was left an orphan at 10, was adopted by his uncle Juan Lagares, and when quite young was apprenticed to Juan del Castillo, from whom he learned the rudiments of painting; but upon the departure of the latter to Cadiz in 1640 Murillo was left without means, and for the succeeding two years he supported himself by painting cheap religious compositions for unimportant convents and churches and rough, brilliantly colored pictures for the *Feria,* a weekly. His close contact with the beggars and print sellers gave him unusual opportunity for studying their characteristics, and his reproductions of them upon canvas exhibit a sympathy and somewhat idealized presentation alike notable. These earlier works may be cited as representing the artist's first period, during which he attained results intensely individualized and at the same time expressive of the type.

The example of Moya, a fellow pupil in the studio of Castillo, made Murillo discontented with his position at Seville, and he resolved to visit Rome, but, not having the means for the longer journey, he set out on foot for Madrid. Velazquez gave him shelter in his own house and access to the royal galleries, where, with untiring zeal, he copied Ribera, Titian, Rubens, Van Dyck, Velazquez, and other masters. This course of practice, extending from 1642 to 1645, gave him a much freer style and greater control of color.

He then returned to Seville, and in 1648 married a wealthy and noble lady of that city, and his house became the resort for distinguished people. In 1650, upon the death of Pacheco, he became the acknowledged head of the Seville school and the president of the academy founded in 1660. During these years he was continually improving in style, becoming more idealistic in conception and individual in technique. His ensuing works are usually classed in accordance with his three styles: an "estilo frio," or cold style (1648–52), fine examples of which are the series of 11 pictures for the small Franciscan convent near Casa del Ayuntamiento; an "estilo cálido," or warm style (1652–56), characterized by a mastery of color contrasts; an "estilo vaporoso," so called from a certain vaporous or misty effect produced. This style, according to Calvert, begins in 1656 with four pictures illustrating the "Founding of Santa Maria Maggiore," painted for Santa Maria Blanca, Seville. A favorite subject of this era was the Immaculate Conception, which he painted no fewer than 15 times, one of the most famous examples being in the Louvre, Paris. It was taken from Spain by Marshal Soult, and bought by the French government at the Soult sale, in 1852, for 586,000 francs.

Murillo is very popular with the general public, but certain artists, while acknowledging his facility and charm, find his work lacking in technique, force, and originality. His work is highly subjective—so much so that the attention of the beholder is often attracted to the personality of the artist rather than to the subject represented. Murillo's chief importance consists in the wonderful manner in which he employed the medium of Spanish realistic forms to express ideal religious conceptions.

Much of the work of the artist was taken from Spain during the Peninsular campaign, a fact that accounts for the number of fine examples to be found in the galleries of Europe, the collections of London and Paris being especially rich.

The cathedral of Seville is rich in his works, among which are "Sts. Leander and Isidore," the "Vision of St. Anthony" (1656), and "La Puríssima" (1668). In the museum are 17 of the 26 pictures painted for the Capuchin monastery at Seville, among which are several "Immaculate Conceptions" and the beautiful "Charity of Thomas of Villanova," the favorite picture of Murillo. Mention should also be made of eight large pictures painted for the church of St. George (1661–74), of which three —"Moses Striking the Rock," the "Miracle of the Loaves and Fishes," and "San Juan de Dios Attending the Sick"—remain in their original places. In the Prado (Madrid) are the beautiful "Children of the Shell" (the infants Jesus and John), the "Adoration of the Shepherds," the "Education of the Virgin," "St. Elizabeth of Hungary" and the "Immaculate Conception with the Crescent Moon." Other famous works are: "The Birth of Mary" (1655), "The Holy Family, with St. Elizabeth" (1670), and the "Angels' Kitchen," in the Louvre; "The Vision of St. Anthony of Padua," in the Berlin Museum. The Hispanic Society of America possesses two small canvases, the Metropolitan Museum a "St. John on Patmos." Excellent examples of Murillo's Madonnas are in the galleries of Dresden, Madrid, Seville, Florence

(Pitti Palace), and Rome (Corsini Palace). Of his admirable series of genre subjects the best-known examples are in the national collections of Munich, Paris (Louvre), London, and St. Petersburg, and at Dulwich, London. "Gallegas at the Window" is in the Widener collection, Philadelphia. Murillo's last work was the altar-piece of St. Catharine, painted at Cadiz for the church of the Capuchins. The picture was never completed, for Murillo fell and had to return to Seville, where he died shortly afterward, April 3, 1682. He was buried, by his own request, in the church of Santa Cruz, Seville, before Pedro de Campagna's picture of the "Deposition from the Cross."

Bibliography. The best biography of Murillo is by A. F. Calvert (New York, 1907); the most recent is by Mayer (Stuttgart, 1913), with many illustrations; others are by F. M. Tubins (Seville, 1864); Stromer (Berlin, 1879); L. Alfonso (Barcelona, 1886); Carl Justi (Leipzig, 1892), a scholarly treatise; Hermann Knackfuss, in *Künstler-Monographien*, vol. x (Bielefeld, 1897); G. C. Williamson (New York, 1903); Lafond (Paris, 1908); S. L. Bensusan (Boston, 1910); also, Sir William Stirling-Maxwell, *Annals of the Artists of Spain* (London, 1848); Curtis, *Velasquez and Murillo* (ib., 1883); Paul Lefort, *Murillo et ses élèves* (Paris, 1892); *Masters in Art*, vol. i (Boston, 1900), with an exhaustive bibliography.

MURIS, mụ'rĕs', John de. An English musical theorist of the fourteenth century. Of his life nothing is known beyond the fact that he was master of mathematics at Oxford. His *Speculum Musicæ*, written between 1340 and 1350, gives a very detailed and scholarly account of the music of that time, and is by far the most important treatise on music written during the Middle Ages. It is divided into seven books, bearing the following titles: 1. "General Introduction"; 2. "Intervals"; 3. "Musical Proportions"; 4. "Consonance and Dissonance"; 5. "The Musical System of the Ancients according to Boëtius"; 6. "Ecclesiastical Modes and Solmisation"; 7. "Mensurable Music—Discantus." Before 1884 musical scholars were greatly puzzled by the open contradictions found in several treatises bearing the name of Muris, until Robert Hirschfeld discovered evidence of the existence of two contemporary theorists of the same name. Consult: Robert Hirschfeld, *Johannes de Muris* (Vienna, 1884); H. Riemann, *Geschichte der Musiktheorie* (Leipzig, 1898); J. Wolf, *Geschichte der Mensuralnotation* (ib., 1904).

MURIS, Julianus de. A French musical theorist of the fourteenth century. In 1321 he was teaching at the Sorbonne in Paris, and in 1350 he was elected rector. Unlike his English namesake, he held very advanced views, strongly advocating the *ars nova* (counterpoint). His principal works are: *Musica Practica, Musica Speculativa, De Discantu et Consonantiis, Ars Contrapuncti, Libellus Practicæ Cantus Mensurabilis.* See Muris, John de.

MUR'ISON, Alexander Falconer (1847–). An English jurist and historian, born in Aberdeenshire and educated at the University of Aberdeen. He became a barrister at the Middle Temple in 1881. He was appointed professor of Roman law in 1883 and of jurisprudence in 1901, and dean of the faculty of law in 1912, at University College, London. He was editor of the *Educational Times* (1902–12), and wrote: *The External History of Roman Law* (1885) and, in the "Famous Scots Series," *Sir William Wallace* (1898) and *King Robert the Bruce* (1899).

MUR'LIN, Lemuel Herbert (1861–). An American Methodist Episcopal clergyman and educator, born in Mercer Co., Ohio. He graduated from De Pauw University (1891), from the De Pauw School of Theology (1892), and from Garrett Biblical Institute (1899), and studied also at the University of Pennsylvania, at Clark University, and in Europe. As early as 1886 he had entered the ministry, occupying several pastorates between this time and 1894 and teaching at Fort Wayne (Ind.) College and Cornell College (Iowa). From 1894 to 1911 he was president of Baker University (Kansas), and thereafter president of Boston University. While on leave of absence (1909–10) he was acting pastor of the American Church in Berlin. Murlin served as president of the Kansas Association of College Presidents, and was a leader in all State educational movements. He was a member of the General Conferences of 1900 and 1904 and of the Ecumenical Methodist Conferences of 1901 and 1911.

MURMEL'LIUS, Johannes (c.1480–1517). A Dutch humanist, born in Roermond, Gelderland, and educated at Deventer, at Cologne, and at Münster. He introduced the study of Greek into Holland almost single-handed and published many excellent schoolbooks. His *Scoparius in Barbariei Propugnatores et Osores Humanitatis* (1514) and his defense of Reuchlin are important documents. Consult the biography by Reichling (Freiburg, 1880) and the selections from his poems, edited by Reichling (ib., 1881).

MURNER, mụr'nĕr, Thomas (1475–1537). A German priest and satirist, famous mostly for attacking Luther and the Reformation. Murner taught and preached in Freiburg, Paris, Cracow, and Strassburg. After voyages to Italy and England he settled in Strassburg, whence in 1525 he was frightened away by the Reformation. Murner was highly enough prized for his religious poems to be made laureate by Maximilian I in 1505. In 1506 he took his doctorate in theology; in 1514 he became guardian of the Franciscan cloister at Strassburg. In 1519 he became a doctor of jurisprudence at Basel. In his *Gäuchmatt*, *Schelmenzunft*, and *Narrenbeschwörung* Murner shows some realistic humor. He translated the *Æneid* in 1515. His *Die deutschen Dichtungen von Ulrich von Hutten* was published in Kürschner's *Deutsche National-litteratur*, vol. xvii (Stuttgart, 1890). Consult: Kawerau, *Murner und die Kirche des Mittelalters* (Halle, 1890); id., *Murner und die deutsche Reformation* (ib., 1891); W. Ries, *Quellenstudien zu Murners satirisch-didaktischen Dichtungen* (Berlin, 1890); H. Schatz's dissertation, *Stimmungen und Effekte in Murners Dichtungen* (Kiel, 1909).

MUROM, mōō'rôm. One of the oldest towns of Russia, situated in the Government of Vladimir, on the left bank of the Oka, 84 miles southeast of Vladimir (Map: Russia, F 3). It has an old cathedral, two monasteries, and a convent. It manufactures tallow and soap and has trade in grain. Murom is believed to have existed before the time of Rurik. Pop., 1897, 12,589; 1911, 18,616.

MURILLO

"THE IMMACULATE CONCEPTION," FROM THE PAINTING IN THE LOUVRE, PARIS

MUROMTSEV, mōō-rôm-tsĕf′, SERGEI ANDREYEVITCH (1850–1910). A Russian jurist and political leader, born in St. Petersburg. He studied at Moscow and Göttingen, and became professor of Roman law and jurisprudence at the University of Moscow, of which he was made prorector in 1880. In 1879 he became editor of the *Juridical Herald.* Because of his liberal opinions he was forced out of the university in 1884. In 1892 the *Juridical Herald* was suppressed and in 1899 the Moscow Juridical Society, of which he was president, was forbidden to hold any further meeting. He was elected by the Constitutional Democratic party as senior deputy from Moscow to the first Russian Duma, of which body he was unanimously chosen president. Muromtsev was successful in keeping its discussions confined to fundamental questions. On the dissolution of the first Duma he was one of the 200 deputies who framed the famous Viborg appeal to the people to refuse to pay taxes, to absent themselves from military conscription, and in other ways to boycott the Russian government for its high-handed treatment of the Duma. For this he was tried and imprisoned. But he remained to the end an influential leader of progressive political thought in Russia. Muromtsev was the author of various works on jurisprudence. See RUSSIA.

MUR′PHEY, ARCHIBALD DE BOW (1777–1832). An American jurist, born in Caswell Co., N. C. He was educated at the University of North Carolina. He served there as a tutor and then as professor of ancient languages until 1802, when he was admitted to the bar. From 1812 to 1818 he was a member of the State Senate. While in this body he was a member of the committee appointed in 1816 to consider the establishment of a system of public schools, and at the session of 1817 submitted an elaborate plan which, while not adopted, formed the groundwork for the later attempts. In 1818 he was elected a judge of the Superior Court and was designated to sit on the Supreme bench during three terms in 1819–20. He persuaded the State to attempt an elaborate system of canals and harbor improvements. In 1822 he secured a share of the Tennessee land warrants for the University of North Carolina and thus saved that institution from ruin. He published *Reports of Cases in the Supreme Court of North Carolina* (3 vols., 1821–26).

MUR′PHY, ARTHUR (1727–1805). An Irish actor and playwright, born at Clomquin, Roscommon. He studied at the English college at St. Omer in France (1738–47), started the *Gray's Inn Journal* (1752–54) in imitation of Addison's *Spectator,* and in 1754 appeared at Covent Garden as Othello. Beginning with *The Apprentice* (1756), he wrote many farces and clever satires. Among his many miscellaneous works are an edition of Fielding with a memoir (1762), an essay on Dr. Johnson (1792), a translation of Tacitus (1793), and a *Life* of Garrick (1801). His plays and early essays were collected (8 vols., London, 1786), and his life was written by J. Foot (ib., 1811).

MURPHY, CHARLES FRANCIS (1858–). An American political leader, born in New York City. He was educated in the public and parochial schools, became interested in politics as a young man, and gained a large personal acquaintance through his success as an athlete and as organizer and member of the Sylvian Club. He became the owner of a series of saloons which he claimed were practically poor men's clubs. In these as elsewhere he demonstrated remarkable ability in political organization. In 1891 he was made the Tammany Hall leader of his assembly district. From 1897 to 1901 he was one of the New York commissioners of docks and ferries, in 1900 being chosen treasurer of the board. After two years as chairman of Tammany Hall and on the retirement of Croker in 1902, Murphy was chosen to succeed him as chief. In 1903 and 1905 he successfully directed the campaigns which elected and reëlected George B. McClellan to the mayoralty. He opposed the nomination of Parker for President in 1904. It had been Murphy's policy to apply for the support of the independent Democrats, but in 1906, when he supported William R. Hearst for Governor, many independent Democrats voted with the Republicans for Hughes. The result was interpreted as a severe defeat for Murphy. In 1909 Tammany Hall nominated Judge Gaynor for mayor. After a campaign of great bitterness, in which Murphy was accused of corruption and of being an evil influence in politics, Gaynor was elected, but the remainder of the ticket was defeated by the fusionists. Many thought that Murphy would be forced to retire because of this defeat, but he continued as chief. In the following year the party elected Dix Governor, and Murphy's power was supposed by some to have been extended from the city throughout the State. During the succeeding years there were scandals regarding highway and canal contracts, and Tammany Hall was sharply criticized. Boss rule became a State and national issue, and Murphy was frequently held up as an example of the vicious boss. In 1912 he favored Harmon and Clark successively for the presidential nomination, but supported Wilson after the convention acted. He was elected presidential elector in the same year. In State affairs he apparently stood passive in the nomination of William Sulzer. After the latter's election, however, they became involved in disputes, and Murphy was alleged to have been the real power in the impeachment of the Governor in 1913—a trial which scandalized the whole country. In 1913 Tammany nominated Edward E. McCall for mayor, and a fierce campaign followed, in which Murphy was assailed furiously. This, as well as the gubernatorial election of the following year, went heavily against the organization, but Murphy remained in power. See the articles on the politicians herein mentioned; also TAMMANY HALL.

MURPHY, EDGAR GARDNER (1869–1913). An American clergyman and author, born at Fort Smith, Ark. He graduated from the University of the South in 1889 and for 12 years was a minister of the Protestant Episcopal church. After 1903 he was engaged exclusively in educational and social work, serving as executive secretary of the Southern Education Board, vice president of the Conference for Education in the South, organizer and secretary of the Southern Society for Consideration of Race Problems and Conditions in the South, and organizer and first secretary of the National Child Labor Committee. He retired on account of ill health in 1908. Besides contributions to periodicals he is author of *Words for the Church* (1896); *The Larger Life* (1896); *Problems of the Present South* (1904; 2d ed., 1909); *The Basis of Ascendancy* (1909).

MURPHY, Francis (1836–1907). An American temperance evangelist, born in Wexford, Ireland. He served in the Federal army during the Civil War. Beginning in 1870 at Portland, Me., he started temperance reform clubs throughout that State, and was their first president. His headquarters were in Pittsburgh, Pa., and after his first addresses there in 1876, 45,000 people signed the pledge. He labored also in Britain, and was chaplain in the Spanish-American War. During the course of his temperance labors in America and abroad Murphy is said to have induced 10,000,000 people to sign the pledge.

MURPHY, Henry Cruse (1810–82). An American politician and historian, born in Brooklyn, N. Y. He graduated at Columbia College in 1830, studied law, and was admitted to the bar in Brooklyn, where he became city attorney and, in 1842, mayor. The next year he became a member of Congress. At the expiration of his term he was elected a delegate to the New York State Constitutional Convention of 1846. In 1847 he was again sent to Congress, and in 1852 was a candidate for the Democratic nomination for President. From 1857 to 1861 he was Minister to Holland, and after his return he served for six successive terms in the New York State Senate. He is perhaps best known for his researches in the early Colonial history of New York. He translated De Vries's *Voyages from Holland to America, 1632 to 1644* (1853). During his residence at The Hague as American Minister he printed for private distribution two monographs, *Henry Hudson in Holland: Origin and Objects of the Voyage which Led to the Discovery of the Hudson River* (1859) and *Jacob Steendam, Noch Vasater: A Memoir of the First Poet in New Netherlands, with his Poems, Descriptive of the Colony* (1861). The latter of these was reprinted in his *Anthology of New Netherland; or, Translations from the Early Dutch Poets of New York, with Memoirs of their Lives,* issued by the Bradford Club in 1875.

MURPHY, John Benjamin (1857–1916). An American surgeon, born at Appleton, Wis. He graduated from Rush Medical College in 1879 and established his practice in Chicago. In 1882–84 he studied in Germany. He was professor of surgery at the Northwestern University Medical School after 1895 and at the Chicago Postgraduate Medical School. In 1911 he was president of the American Medical Association. Murphy became known through success in autogenous bone grafts, intestinal anastomosis and approximation without sutures by means of a special button (Murphy's button, 1892), union of the femoral artery severed by a gunshot wound, and through many other operations. He edited *General Surgery* for the "Practical Medicine Series" (1901 et seq.). *The Clinics of John B. Murphy, M.D., at Mercy Hospital, Chicago,* is a publication appearing periodically.

MURPHY, John Francis (1853–1921). An American landscape painter. He was born in Oswego, N. Y., had early to struggle with poverty, and studied art by himself. He first exhibited in 1876 at the National Academy, of which he was elected a member in 1887. At first influenced by Wyant and Inness, after 1900 he attacked the modern problems of light and air, thus combining the old and new theories of landscape painting. His chief characteristics are extreme refinement and charm, poetic sentiment, and beauty of surface. His composition is simple and his rendering of soil unique. A past master of values, he prefers the quiet and subdued aspects of nature. Good examples of his work are "October" (Corcoran Gallery, Washington); "The Path to the Village" and "Indian Summer" (both in the National Gallery, Washington); "The Old Barn" (Metropolitan Museum, New York); "The Hill Top" (Art Institute, Chicago); "Afternoon Lights on the Hills" (Carnegie Institute, Pittsburgh); "Neglected Lands" (Buffalo Academy). He received numerous awards, including a gold medal at Charleston (1902) and the Inness medal in 1910.

MURPHY, Lambert (1885–). An American tenor, born at Springfield, Mass. While pursuing an academic course at Harvard University, he studied singing under T. L. Cushman in Boston from 1904 to 1908. Having filled positions in several important churches in Boston, Brookline, and Fairhaven, he went to New York in 1910 as soloist of St. Bartholomew's. After further study under Isidore Luckstone, he was engaged (1911) as a member of the Metropolitan Opera. Murphy made his reputation chiefly as a concert singer, appearing at many of the great festivals.

MURPHY, Martin (1832–). A Canadian civil engineer. He was born in County Wexford, Ireland, was educated at the public schools and privately, and began engineering work in 1852 on the Midland Great Western Railway. He was resident engineer of the Dublin, Wicklow, and Wexford Railway from 1862 to 1868, when he went to Canada and served for a year as engineer for the city of Halifax. He was chief engineer for the survey of projected Nova Scotia railways in 1870–71 and contracted for the building of Intercolonial Railway bridges in 1871–74. For 30 years (1875–1905) he was provincial engineer for Nova Scotia, and in 1906 was appointed government inspecting engineer of the National Transcontinental Railway, western division. He was president of the Nova Scotia Institute of Science (1882–83) and of the Canadian Society of Civil Engineers (1902). His views on and illustrations of bridge work won high recognition from the Engineering Congress at the World's Fair, Chicago (1893).

MURPHY, Robert (1806–43). A British mathematician, born at Mallow, County Cork, Ireland. He was early self-taught, but was sent by friends to Caius College, Cambridge, where he graduated B.A. and was elected a fellow in 1829. His fellowship was sequestered for his creditors in 1832. In 1838 he became examiner in mathematics and natural philosophy at London University. Murphy contributed important papers to the *Cambridge Philosophical Transactions* (1831–36), to the *Philosophical Magazine* (1833–42), and to the *Philosophical Transactions* (1837); and published also *Elementary Principles of Electricity, Heat, and Molecular Actions* (1833) and *A Treatise on the Theory of Algebraical Equations* (1839; reprinted, 1847).

MURPHYSBORO. A city and the county seat of Jackson Co., Ill., 87 miles by rail southeast of St. Louis, Mo., on the Big Muddy River and on the Illinois Central, the Mobile and Ohio, and the St. Louis, Iron Mountain, and

Southern railroads (Map: Illinois, F 10). It is the centre of a rich farming district producing wheat and corn and containing considerable mineral wealth, particularly deposits of shale and bituminous coal. There are railroad shops, coal mines, and manufactories of flour, lumber, ice, beer, foundry and machine-shop products, shoes, building and paving brick, etc. Murphysboro contains the St. Andrew's Hospital and has a fine high school. Gen. John A. Logan (q.v.) was born here. The city has adopted the commission form of government. Pop., 1900, 6463; 1910, 7485; 1920, 10,703.

MURRAIN, mŭr'ĭn (OF. *morine*, from Lat. *mori*, Skt. *mar*, to die). A general term loosely used to designate a variety of diseases of domestic animals, but more correctly restricted to the vesicular epizoötic, popularly known as foot-and-mouth disease. See TEXAS FEVER.

MUR'RAY. A city in Salt Lake Co., Utah, 6 miles south of Salt Lake City, on the Oregon Short Line, the Salt Lake, and the Denver and Rio Grande railroads. The city hall and high school are both attractive buildings. There are smelters and refineries, canning factories, flour mills, lumber-finishing plant, candy factory, fish hatcheries, and brick and tile works. The water works and one of the electric-light plants are owned by the city. Pop., 1910, 4057.

MURRAY, ALEXANDER (1755–1821). An American naval officer, born at Chestertown, Md. At the outbreak of the Revolution he received a commission in the navy, but while waiting for a ship served, during 1776–77, as lieutenant and captain in the First Maryland Regiment and participated in the operations around New York. In the latter part of 1777 he commanded the *Revenge* with letters of marque to prey on British commerce. He was captured, but after exchange served on board the *Trumbull* and was again captured. When exchanged again he commanded a privateer and afterward served on the *Alliance*. When the navy was reorganized in 1798 he was one of the first six captains appointed, and commanded the *Montezuma* during the troubles with France. He served in the Mediterranean during the war with Tripoli. In 1821 he was placed in command of the Philadelphia Navy Yard, and died shortly afterward, being at that time the senior officer of the navy.

MURRAY, ALEXANDER (1775–1813). A linguist, born at Dunkitterick, Kirkcudbrightshire. He graduated at Edinburgh University, became parish minister of Urr in his native shire (1806) and professor of Oriental languages in Edinburgh University (1812). He died April 15, 1813. Murray edited in a thorough manner Bruce's *Travels* (1805; new ed., 1813); wrote for his students *Outlines of Oriental Philology* (1812); and contributed to the *Edinburgh Review*. After his death appeared his chief work, *History of the European Languages*, with a memoir and the fragment of an autobiography (2 vols., Edinburgh, 1823).

MURRAY, ALEXANDER STUART (1841–1904). A distinguished English archæologist, born near Arbroath. He was educated at the University of Edinburgh and in Berlin. In 1867 he was appointed assistant in the department of Greek and Roman antiquities of the British Museum and in 1886 keeper of the same. In 1894–96 he directed excavations in Cyprus. His publications include: *Manual of Mythology* (1873; reëdited, 1895); a *History of Greek Sculpture* (1880–83; new ed., 1890); *Handbook of Greek Archæology* (1892); *Designs from Greek Vases* (1894); *Terra-Cotta Sarcophagi* (1898); "Greek Bronzes," in the *Portfolio* (1898); *Excavations in Cyprus*, published by the British Museum (1900); *Sculptures of the Parthenon* (1903).

MURRAY, ALMA (1854–). An English actress, born in London, the daughter of an actor, Leigh Murray. Her first appearance was at the Olympic in 1870 as Sacharissa in *The Princess*. She played at the Lyceum with Irving in 1879 and at different West End theatres from 1882 to 1897, and took a prominent part in the few attempts to produce the dramas of Shelley and Browning, playing Beatrice in *The Cenci* (1886) and Mildred in *A Blot on the 'Scutcheon* (1888). After 1899 she gave recitations and became a teacher of elocution and acting. Alma Murray married Alfred Forman, who translated several of Wagner's librettos. She played Mrs. Maylie in *Oliver Twist* (1905, 1912), the Queen in *Pelleas and Melisande* (1911), Lady Dedmond in Galsworthy's *Fugitive* (1913), and Mrs. Eynsford-Hill in Shaw's *Pygmalion* (1914).

MURRAY, DANIEL ALEXANDER (1862–). A Canadian mathematician. He was born in Colchester County, Nova Scotia, and was educated at Dalhousie and Johns Hopkins universities and in Berlin and Paris. He was successively associate professor of mathematics at New York University, instructor at Cornell, professor at Dalhousie University, and, after 1907, professor of applied mathematics at McGill. He published: *Introductory Course in Differential Equations* (1897); *An Elementary Course in the Integral Calculus* (1898); *Plane and Spherical Trigonometry* (1902); *Essentials of Trigonometry and Mensuration* (1909); *Elements of Plane Trigonometry* (1911).

MURRAY, DAVID (1830–1905). An American educator. He was born at Bovina, Delaware Co., N. Y., to which his parents had come from Scotland in 1816. He graduated from Union College in 1852. The following year he became assistant in the Albany Academy, and in 1857 was advanced to the principalship. In 1863 he accepted the chair of mathematics and physics in Rutgers College. Having assisted the Japanese Embassy in 1872 in investigating the educational systems of the United States and other countries and preparing statistics thereon, he was invited by Japan to assume the supervision of its educational affairs. He removed to that country and was occupied for six years in these duties. At the time of his return to America in 1879 he was decorated by the Emperor with the Order of the Rising Sun. In 1880 he became secretary of the regents of the University of the State of New York, and held this post nine years. He published several addresses, and was the author of *Manual of Land Surveying* (1872); an introductory chapter to *Outlines of the History of Japanese Education* (1876); *Japan* (1894; rev. ed., by Baron Kaneko, 1906), in the "Story of the Nations Series"; *History of Education in New Jersey* (1899).

MURRAY, DAVID (1849–). A Scottish landscape painter. He was born in Glasgow and studied at the Glasgow Art School. After devoting 11 years to business he turned to landscape painting and in 1882 removed to London. Elected an Academician in 1905, he exercised a

marked and salutary influence on contemporaneous British landscape painting. His color, especially in his earlier works, is fresh and brilliant, his handling dexterous, and he delights in delicate detail and movement. His subjects are chiefly landscapes of Scotland, Picardy, southern England, and the Italian lakes, and marines from the Dorset coast. Among the best known are "My Love has Gone a-Sailing" and "In the Country of Constable" (both in the Tate Gallery), "Loch Linne near Port Appin," "River Road," and a "View of Windsor."

MURRAY, David Christie (1847–1907). An English novelist, born at West Bromwich, Staffordshire. He was educated at a private school. He began his career as a reporter on the Birmingham *Morning News*, and in 1873 went to London, where he joined the staffs of the *Daily News* and the *World*. During the Russo-Turkish War he was a special correspondent for the *Times*, and subsequently he traveled widely and lectured. In 1879 he published in *Chambers's Journal* his first long novel, *A Life of Atonement*. Other books are: *Joseph's Coat* (1881); *Val Strange* (1882); *Time's Revenge* (1893); *In Direst Peril* (1894); *A Rogue's Conscience* (1896); *Tales in Prose and Verse* (1898); *A Race for Millions* (1898); many other novels; *A Novelist's Note Book* (1887); *Guesses at Truths, Ethical, Social, Political, and Literary* (1908), essays originally contributed to the *Referee*, under the pseudonym Merlin; *Recollections* (1908).

MURRAY, Lord George (c.1700–60). A Scottish Jacobite general, son of the first Duke of Athol. His father was loyal to the house of Hanover, but Lord George followed his elder brother, the Marquis of Tullibardine, into the Jacobite uprising of 1715, commanded a battalion at Sheriffmuir, and made his escape to France the following year. He was living in Scotland at the time of the rebellion of 1745, and was the most capable of Prince Charles's generals. To Lord George Murray's personal bravery, sound judgment, and skill in handling undisciplined troops must be attributed the chief credit for the Jacobite victories at Prestonpans and Falkirk, as well as for the Highlanders' safe retreat from England after the raid to Derby. Murray escaped to the Continent when the cause was lost and died in Holland.

MURRAY, George Henry (1861–). A Canadian statesman of Scottish parentage, born at Grand Narrows, Nova Scotia. He began his education in his native place, finished it at Boston University, was called to the bar in 1883, and practiced his profession at North Sydney, Nova Scotia. He was appointed a member of the Nova Scotia Legislative Council in 1889, but resigned in 1891, was an unsuccessful Liberal candidate for the House of Commons, was reappointed to the Legislative Council the same year and also became a member, without portfolio, of the provincial cabinet of William Stevens Fielding (q.v.). In 1896 he became Premier and Secretary for his native province, a position he still retained in 1915. He was a delegate to the Interprovincial Conference at Ottawa in 1906.

MURRAY, (George) Gilbert (Aimé) (1866–). A British classical scholar, born at Sydney, New South Wales. He went to England in 1877 and was educated at Merchant Taylors' School, London, and at St. John's College, Oxford. In 1889–99 he was professor of Greek at the University of Glasgow and after 1908 regius professor of Greek at Oxford. He received honorary degrees from Glasgow, Birmingham, and Oxford. Gilbert Murray's publications include a *History of Ancient Greek Literature* (1897); *Liberalism and the Empire* (1900), part author; a text edition of Euripides, *Fabulæ*, in three volumes (1901, 1904, 1910); *The Rise of the Greek Epic* (1907; 2d ed., 1911); *Four Stages of Greek Religion* (1913); *Euripides and his Age*, in "Home University Library" (1913); *Hamlet and Orestes* (1914); and two plays, *Carlyon Sahib* (1899) and *Andromache* (1900). Murray is perhaps best known for his admirable verse translations of various plays of Euripides: the *Hippolytus* and the *Bacchæ* (together with the *Frogs* of Aristophanes; 3d ed., 1906); the *Medea*, *Trojan Women*, and *Electra* (1905–07); *Iphigenia in Tauris* (1910); *The Rhesus* (1913). These were presented at the Court Theatre, London. In the United States Granville Barker and his wife, Lillah McCarthy (qq.v.), gave outdoor performances of *The Trojan Women* and *Iphigenia in Tauris* at various colleges (1915). Murray also translated Sophocles' *Œdipus Rex* (1910).

MURRAY, (Eustace Clare) Grenville (1824–81). An English journalist, the illegitimate son of Richard Grenville, second Duke of Buckingham. After studying at Magdalen College, Oxford, and at the Inner Temple, he entered the diplomatic service and held various posts at Vienna, Hanover, Constantinople, and Odessa. Returning to England in 1868, he founded the *Queen's Messenger* (1869), the first of the English satirical society papers, and in the same year he was publicly horsewhipped by Lord Carrington, whose equanimity he had seriously disturbed. Driven from England, he settled in Paris, where he figured as the Comte de Rethel d'Aragon, borrowing the title of his Spanish wife. He was one of the pioneers in the gossip and scandal of modern journalism. Among his separate publications are: *The Roving Englishman* (1854); *Round about France* (1878); *Side Lights on English Society* (1881), containing a mock dedication to the Queen.

MURRAY, Hugh (1779–1846). A Scottish geographer, born at North Berwick. Between 1804 and 1814 he wrote several works of fiction and two philosophical works, but after 1816, when he became a fellow of the Royal Society of Edinburgh, he applied himself to the study of geography. He was chiefly noted for his share in the *Encyclopædia of Geography* (1834). He also compiled historical or geographical works upon *The Southern Seas* (1826); *Polar Seas* (1830); *Africa* (1830); *British India* (1832); *China* (1836); *British America* (1839); *The United States* (1844).

MURRAY, James (1719–94). The first British Governor of Canada. He was the fifth son of Alexander, fourth Lord Elibank, and entered the army about 1740. In 1757 he was sent with his regiment to America, where he commanded a brigade in the siege of Louisburg in 1758, and led the left wing of Wolfe's army in the battle on the Heights of Abraham, Sept. 13, 1759. The next year he successfully defended Quebec against an attack by a superior French force under De Lévis, and later in the same year assisted General Amherst in reducing Montreal. He was appointed Governor of

Quebec in October, 1760, and of all Canada in 1763, and continued in that position until 1766. He became Governor of Minorca in 1774, was besieged in Fort St. Philip in 1781 by the French and Spanish under the Duc de Crillon, and after a desperate defense was forced in 1782 to capitulate. Upon his return to England he was tried by a court-martial, but was acquitted. He became a full general in 1783, and died near Battle, in Sussex. For an account of his career in America, consult Francis Parkman, "Montcalm and Wolfe," in *France and England in America*, part vii (Boston, 1884; new ed., 1898).

MURRAY, Sir James Augustus Henry (1837–1915). A British lexicographer born at Denholm, Roxburghshire, Scotland. After his elementary studies at home and in Edinburgh he continued his work at London University. Having taught at Hawick, he became master of Mill Hill School, near London, a position which he retained for 15 years (1870–85). Already distinguished as a scholar, he had been twice elected president of the Philological Society (1878–80, 1882–84). For that society and for the Oxford University Press he assumed, in 1879, the editorship of the *New English Dictionary on Historical Principles* (10 vols., 1888 et seq.), the most exhaustive work in lexicography ever attempted in any language. In 1885 Dr. Murray moved from Mill Hill to Oxford, where his Scriptorium is a notable feature of the city. Before beginning this work he published, notably, *The Dialect of the Southern Counties of Scotland* (1873), the *Complaynt of Scotland* (1874), and the *Romance and Prophecies of Thomas Erceldoune* (1875). In 1884 he received a civil-list pension of £270, in 1900 was chosen Romanes lecturer at Oxford, and in 1908 was knighted. He was honored by degrees from some of the great universities of the world. A full account of the beginning of the dictionary and of its making is to be found in Dr. Murray's address to the Philological Society (1879). See Dictionary.

MURRAY, or **MORAY,** mŭr'ĭ, James Stuart, Earl of (?1531–70). A Scottish statesman. He was the natural son of James V of Scotland and half-brother of Mary, Queen of Scots. Destined for an ecclesiastical life, he was educated from 1541 to 1544 at St. Andrews, and early received ecclesiastical benefices. He accompanied his sister Mary to France in 1548, returning the following year to gain as a youth military experience and renown by driving a strong party of English from the coast with great loss. It is probable that he began to sympathize with Protestants as early as 1552, and it is certain that he was an attendant on Knox's lectures in 1555, and joined with others in urging his return from Geneva the following year. From 1556 on he was the consistent leader of the Scottish reformers, and after 1558 till his death he was the most powerful single factor in Scottish politics. He was present at Mary's marriage to the Dauphin of France, afterward Francis II, and was sent to France in 1561 to invite the widowed Mary, after the death of the Queen Regent, to return to Scotland as its Queen. For a few years Lord James Stuart, as Mary's chief minister and adviser, seemed to subordinate his own ambition to the good of Scotland, the preservation of his religion, the future union of England and Scotland, and the success of his sister's reign. In 1562 Mary created him Earl of Mar, but he soon resigned this title to become the Earl of Murray. When it became evident that she would not be acknowledged by Elizabeth as her successor, Mary turned to a Catholic alliance, which forced Murray to break with his sister, and a series of intrigues and counterintrigues began. At first inclined to favor the marriage of Mary with Darnley, he soon saw that it meant Catholic supremacy, hence he opposed it finally by an appeal to arms, but was defeated and forced to take refuge in England (1565). In 1566, after intriguing with Bothwell, professing at the same time friendship for Darnley, and being cognizant, at least, of the plan to murder Rizzio, Murray returned to Edinburgh to regain his power. For the moment outwardly reconciled to his sister, he went to France, but returned shortly at the request of the lords, who had taken arms, to become Regent of the Kingdom. After Mary's escape from prison he defeated her forces at Langside, near Glasgow, 1568, and on her flight to England he became one of the commissioners sent to that country to conduct the negotiations against her. Later, however, he urged Elizabeth to permit Mary to return to Scotland, but was assassinated in 1570 by Hamilton of Bothwellhaugh before his plans had matured. He was a cold, ambitious man, endowed with great abilities, personally moral, but in politics without scruples. Consult authorities cited under Mary Stuart.

MURRAY, Sir James Wolfe (1853–1919). A British army officer. He was educated at Harrow and Woolwich and entered the Royal Artillery in 1872. He served in the Ashanti campaign of 1895 and in Natal in 1899–1900; was quartermaster-general in India in 1903–04 and master general of ordnance in 1904–07; commanded the Ninth Division in India in 1907–11; then commanded the Imperial troops in South Africa; and in 1915 succeeded French as chief of the British Imperial general staff. Murray was made K.C.B. in 1900.

MURRAY, John (1741–1815). The founder of the Universalist body in America. He was born at Alton, England, Dec. 10, 1741. At the age of 11 his parents removed to Cork, Ireland. He became a Methodist under the preaching of Wesley and Whitefield. Having read a book by James Relly, a Universalist, he was led to adopt his views, and for this was excommunicated at Whitefield's Tabernacle, London. Persecution for opinion, pecuniary embarrassment, and grief for the loss of his wife caused him to seek retirement in America. He preached his first sermon in America Sept. 30, 1770, in a small church, in an obscure place in New Jersey, called Good Luck. Believing fully in the doctrine of universal salvation, he gave himself to earnest labor, first in New Jersey and New York, afterward in Newport, Providence, Boston, Portsmouth, Norwich, and other places in New England. In 1774 he fixed his residence in Gloucester, Mass., where he was represented as a Papist and a secret emissary of Lord North in the interest of the English ministry. He was abused, and by a vote ordered to leave the town, but the interference of powerful friends saved him and he was allowed to remain. In 1775 he was appointed chaplain of a Rhode Island brigade encamped near Boston. Ill health compelled him to leave the army, and he returned to Gloucester, where he was settled over a society of Universalists. He was instrumental

in the organization of a convention of his sect, which met at Oxford, Mass., September, 1785, and took the name of Independent Christian Universalists. In 1793 he was installed pastor of a society of Universalists in Boston, where he remained till his death, Sept. 3, 1815. He published *Letters, and Sketches of Sermons*, three volumes, and an autobiography (1813), continued by his wife (9th ed. by Demorest, 1870). Consult R. Eddy, *Universalism in America*, vol. i (Boston, 1886).

MURRAY, originally **MACMURRAY**, JOHN (1745–93). The first of four great English publishers, John MacMurray, of the stock of the Murrays of Athol, was born in Edinburgh. Having served as lieutenant of marine (1762–68), he retired on half pay and began to publish and sell books in London. John MacMurray purchased the bookselling business of Paul Sandby, opposite St. Dunstan's Church, London, and, dropping the Scottish prefix, became a bookseller at 32 Fleet Street. He brought out the *English Review* (1783–96), published, among other notable books, the first two volumes of the elder Disraeli's *Curiosities of Literature*, and was one of the original proprietors of the *Morning Chronicle*. He was succeeded in due time by his son JOHN (1778–1843). One of the earliest hits of John the second was Mrs. Rundall's *Domestic Cookery* (1808), which had been through 65 editions by 1841. With the coöperation of Scott, Canning, and others, he founded the *Quarterly Review*, a Tory organ, in opposition to the Whig *Edinburgh Review*, then at the height of its influence. The first number was published Feb. 1, 1809, under the editorship of William Gifford. The new periodical was completely successful, and brought Murray into communication not only with the chief writers but also with the conservative statesmen of the time. A still more fortunate acquaintance was that with Lord Byron, whose *Childe Harold* (first two cantos) was published by Murray in 1812. Murray now (1812) removed from Fleet Street to Albemarle Street. Almost all the literary magnates of the day flocked to Murray's house, and it was there that Scott and Byron first met. As Byron's publisher he made fame and a fortune, and he paid the poet handsomely—nearly £20,000 all told; and his dealings with Crabbe, Moore, Campbell, and Irving were princely. The second John Murray was succeeded by his son, JOHN MURRAY the third (1808–92). The long-famous Murray guidebooks to various European countries were from his pen; and many great works in history, biography, travel, art, and science were issued by him. Among his successes were Livingstone's *Travels and Last Journals*, Smiles's *Life of George Stephenson*, and Darwin's *Origin of Species by Natural Selection*. At his death he was succeeded by his son, the fourth John Murray (1851–), who, with his brother A. H. Hallam Murray, conducted the business. Consult S. Smiles, *A Publisher and his Friends* (2 vols., London, 1891), for the second John Murray; and three articles by F. Espinasse, "The House of Murray," in the *Critic* (ib., 1860).

MURRAY, SIR JOHN (1841–1914). A British naturalist and oceanographer. He was born at Coburg, Ontario, studied at Victoria College there and at the University of Edinburgh, and devoted himself to natural science. In 1868 he went through the Arctic regions on a whaler studying fauna and flora; from 1872 to 1876 was a naturalist of the *Challenger* expedition; and, after six years' service as assistant, became editor in 1882 of the scientific reports of the *Challenger* voyage. He contributed to the *Narrative of the Cruise of H.M.S. Challenger* (1882–85) and wrote the *Challenger Report on Deep-Sea Deposits*, with Renard (1890). He participated in the *Michael Sars* North Atlantic expedition in 1910, gathering material for *The Depths of the Ocean* (1912). He published also *The Ocean: A General Account of the Science of the Sea* (1913). Murray was knighted in 1898.

MURRAY, JOHN. See DUNMORE, JOHN MURRAY, EARL OF.

MURRAY, JOHN CLARK (1836–). A Canadian writer on philosophy and psychology, and a university professor, born at Paisley, Scotland. He studied at Glasgow, Edinburgh, Göttingen, and Heidelberg. In 1862 he became professor of mental and moral philosophy in Queen's University, Kingston, Canada, and in 1872 he was called to a similar chair at McGill University, Montreal. Murray received the degree of LL.D. from Glasgow. He is author of *An Outline of Sir William Hamilton's Philosophy* (1870); *Ballads and Songs of Scotland* (1874); *Memoir of David Murray* (1880); *Handbook of Psychology* (1885); *Solomon Maimon: An Autobiography*, translated from the German (1888); *An Introduction to Ethics* (1891); *An Introduction to Psychology* (1904); *A Handbook of Christian Ethics* (1908).

MURRAY, LINDLEY (1745–1826). An English grammarian of American birth, born at Swatara, Lancaster Co., Pa., April 22, 1745. He was educated at an academy of the Society of Friends, and, on his father's removal to New York, was placed in a counting house, from which he escaped to a school in New Jersey. He afterward studied law and had a good practice in New York. During the Revolutionary War he engaged in trade with such success as to accumulate a handsome fortune. His health failing, he went to England (1784) and purchased an estate at Holdgate, near York, where he devoted himself to literary pursuits and botany. His garden rivaled the Royal Gardens at Kew. In 1787 he published his *Power of Religion on the Mind*, which passed through 20 editions. His *Grammar of the English Language* was issued in 1795, and was followed by *English Exercises*, the *Key*, the *English Reader* (1799), and a *Spelling Book* (1804), which went through some 50 editions. Murray died Feb. 16, 1826. Consult the *Memoir of Murray*, containing an autobiography by Frank (York, 1826), and *Life* by Egle (New York, 1885).

MURRAY, or **MORAY**, mŭr'ĭ, SIR ROBERT (?–1673). A Scottish statesman. He was educated at St. Andrews University, entered the French army, and, through the influence of Richelieu, rose to the rank of colonel. He was chosen secret envoy to negotiate a treaty between Scotland and France, and while at Newcastle in December, 1646, formed a plan for the escape of Charles I, which came to nothing through the King's irresolution. In 1651 he was appointed justice clerk, and soon afterward was made a Privy Councilor and a Lord of the Session, but never took his seat upon the bench. After the Restoration, as Lord of Exchequer and Deputy Secretary he was one of the triumvirate, the other two members of which were Lauderdale and the King, that ruled Scotland

from 1663 till 1670. He was one of the founders of the Royal Society, the oldest scientific society in Great Britain. As a chemist and musician he had a good reputation in his time.

MURRAY, WALTER CHARLES (1866–). A Canadian educator. He was born at Studholm, New Brunswick, and was educated at New Brunswick, Edinburgh, and Berlin universities. He was professor of philosophy and economics at New Brunswick University (1891–92); George Munro professor of philosophy and lecturer on education at Dalhousie University (1892–1908), and in the latter year was appointed president of the provincial university of Saskatchewan. He was elected a director of the Dominion Educational Association. He published *Studies in Mind Growth* (1904) and *Local Government in the Maritime Provinces* (1909).

MURRAY, WILLIAM, first EARL OF MANSFIELD. An English jurist. See MANSFIELD, WILLIAM MURRAY, first EARL OF.

MURRAY, WILLIAM HENRY HARRISON (1840–1904). An American Congregational clergyman, lecturer, and author. He was born at Guilford, Conn., and graduated from Yale in 1862. In Connecticut he held pastorates at Washington (1863–64), Greenwich (1864–66), and Meriden (1866–68). From 1868 to 1874 he was pastor of the Park Street Church, Boston. In 1869–73 and in 1875–78, while pastor of the Independent Congregational Church, he gave several series of popular sermons, or Sunday evening lectures, before large audiences in Music Hall, Boston, published as *Music Hall Sermons* (2 vols., 1870–73). Subsequently he withdrew from the ministry and followed a varied career in business, lecturing, and writing. His writings on life in the woods and mountains, which brought him the nickname of "Adirondack Murray," include: *Adventures in the Wilderness, or Camp Life in the Adirondack Mountains* (1868); *The Perfect Horse* (1873); *Words Fitly Spoken* (1873); *Daylight Land* (1888). His *Complete Works*, including a number of "Adirondack Tales," were published at Hartford in 1900 (7 vols.). Consult H. V. Radford, *Adirondack Murray* (New York, 1905).

MURRAY, WILLIAM VANS (1762–1803). An American diplomat, born at Cambridge, Somerset Co., Md. He received a classical education and went to London, where he studied law for two years in the Inner Temple. Returning to Maryland in 1785, he was admitted to the bar, and began the practice of his profession, in which he soon attained prominence. From 1791 to 1797 he was a Federalist member of Congress. In 1797 he was appointed by President Washington United States Minister to the Netherlands, and in 1799, with Oliver Ellsworth (q.v.) and William R. Davie, was sent to Paris to negotiate a treaty which should adjust the difficulties that had brought France and the United States to the verge of war. The successful negotiation of the convention signed at Paris, Sept. 30, 1800, was said to be largely the work of Murray. He was the author of a valuable brief treatise on *The Constitution and Laws of the United States.*

MURRAY BAY, or **MALBAIE.** A summer resort and the capital of Charlevoix County, Quebec, Canada, on the left bank of the St. Lawrence River, about 80 miles northeast (direct) of Quebec, with which it has steamboat communication (Map: Quebec, H 3). Situated on the Murray estuary which forms the bay, it is the principal watering place on the north shore of the St. Lawrence, and is much frequented for its scenery, invigorating air, bracing though cold bathing, its boating, and fishing. It has county buildings, a Roman Catholic convent, and a boys' college. The town, of which lumber, flour, and carding mills, together with cheese factories, are the chief manufacturing establishments, is at the mouth of the Murray River, the dependent summer colonies being at Pointe à Pic (population, in 1911, 617) and Cap à l'Aigle, the extremities of the bay, 3 miles distant. It was one of the stations for United States prisoners of war in 1776. Pop., 1901, 826; 1911, 1449.

MURRAY RIVER. The principal river of Australia, draining, together with the Darling, practically the whole southeastern quarter of the continent. It rises in the Australian Alps near the east boundary of Victoria, and flows for two-thirds of its course northwestward, forming the boundary between Victoria and New South Wales (Map: South Australia, F 5). After entering South Australia it makes an abrupt turn to the south and enters the Indian Ocean through Encounter Bay, 40 miles southeast of Adelaide. Its length is about 1500 miles. For the first 60 miles of its course it passes between precipitous rocky cliffs in one place, known as the Murray Gates, reaching the height of 3000 feet, while some of the highest peaks of the continent are close to its banks. After passing through the Gates the hills become gradually lower, and finally the river enters the immense Australian plains. Here the Murray is sluggish, with numerous windings, and flanked by lagoons. It receives here scarcely any tributaries except a few very large ones coming from the mountains. Among these are the Murrumbidgee (q.v.), which is longer than the main stream from the point of confluence, and the Darling (q.v.), whose length exceeds that of the entire main stream. During the dry season the river loses by evaporation and shrinks even in its lower course to a width of less than 300 feet, but in winter its volume increases enormously, and great inundations occur. In the wet season it is navigable for small steamers for the greater part of its course as far as Albury, but its mouth, owing to sand bars, is inaccessible for large vessels. There are a number of ports on its shores, whose total shipping probably amounts to more than one and a half million tons annually.

MUR'RAYSHIRE. A maritime county of Scotland. See ELGINSHIRE.

MURRE, mûr (also *marre*, of uncertain etymology). Any of several species of guillemot (q.v.).

MURRELET, mûr'lĕt (dim. of *murre*). Any of several small murrelike birds confined to the North Pacific Ocean. The black-throated, or ancient, murrelet (*Synthliborhamphus antiquus*) is a handsome black-and-white bird about 10 inches long. It breeds from Sitka northward, and is found as far south as Oregon in winter. A Japanese murrelet is closely allied to it. The remaining four species represent another genus (*Brachyrhamphus*) chiefly distinguished by a more slender and less compressed bill. Two of the species are Arctic forms, one coming south to southern California in winter, while the other two occur in southern and Lower California.

MUR'RELL, William (1853–1912). An English physician. He was educated at University College, London, where he was scholar and demonstrator (1875–78), at the same time practicing medicine; served as medical examiner at Edinburgh (1882–87) and in the Royal College of Physicians in London (1886–90); and became physician and lecturer at Westminster Hospital. He wrote: *Nitroglycerin as a Remedy for Angina Pectoris* (1882), crowned by the French Academy of Medicine in 1885; *What to Do in Cases of Poisoning* (1882; 10th ed., 1907); *Massage as a Mode of Treatment* (1886; 5th ed., 1890), translated into French and German; *Chronic Bronchitis and its Treatment* (1889); *A Manual of Pharmacology and Therapeutics* (1896); *Aids to Materia Medica* (1898–99); *Forensic Medicine and Toxicology* (6th ed., 1903).

MUR'REY. See Heraldry.

MURRUMBIDGEE, mŭr'ŭm-bĭj'ē. A river of New South Wales, the second largest tributary of the Murray. It rises on the northeast slope of the Australian Alps, in the southeast corner of the state, within 40 miles of the Pacific coast (Map: New South Wales, B 4). It flows first northward through a hilly country, then westward through the great plains till it enters the Murray 90 miles, in a straight line, southeast of the mouth of the Darling. Its length is 1350 miles, but, though it is longer than the Murray from the point of confluence, it is not of great commercial importance, owing to its shallowness. During the wet season it is navigable 500 miles for light-draft steamers. Its principal affluent is the Lachlan (q.v.). In 1829 Captain Sturt traced the Murrumbidgee to the Murray, and in 1831 Captain Barker, in search of it, was murdered by the natives.

MURRY. See Moray.

MUR'SA, or **MURSIA.** The Roman name for Eszék (q.v.).

MURSHIDABAD, mo͝or'shē-dȧ-bȧd'. The capital of a district of Bengal, British India, on the left bank of the Bhagirathi, a branch of the Ganges, 115 miles north of Calcutta (Map: India, F 4). Azimganj, on the opposite side of the river, with ferry communication, is usually reckoned part of Murshidabad. The town covers a great area, several miles in length and breadth, but, having lost much of its former importance as a trade and revenue collection centre, it is no longer fully populated. The buildings are for the most part of mud, but there are several brick structures—mosques and tombs—along the river bank; and centrally situated is the Nizamat Kila, or Nawab's palace, a building of great beauty, completed in 1840. It has many treasures, including jewelry, china, arms, and pictures. The town is on the most frequented water route from Calcutta to the United Provinces. Its trade was formerly of great importance, and its banking connections are still considerable, Jain merchants here being among the wealthiest in India. Institutions include a college for education of the Nawab's family. The rearing of silkworms and the weaving of silk are the chief of many industries, which include ivory carving, the manufacture of gold and silver lace, embroidery, hookah pipes, and musical instruments. Murshidabad was the last Mohammedan capital of Bengal, and after the British annexation remained the capital until 1790, when the administrative seat was settled at Calcutta. Population in 1891, of Murshidabad and Azimganj, 35,756; in 1901, of Murshidabad, 15,168, of Azimganj, 13,383; total 28,551.

MURTOS. See Martos.

MURU'MURÚ PALM. See Astrocaryum.

MURVIEDRO. A town in Spain. See Sagunto.

MURZUK, mo͝or-zo͝ok', or **MOURZOUK.** The capital of Fezzan (q.v.), in Italian Libya, north Africa, situated in an unhealthful region in lat. 25° 50′ N. and long. 14° 10′ E. (Map: Africa, F 2). It is surrounded by a wall and has an extensive palace. The inhabitants manufacture leather and textiles; it has also a large transit trade, being one of the three chief caravan stations in the interior. The population is estimated at 6500.

MUS, Publius Decius. See Decius Mus, Publius.

MUSACEÆ, mū-zā'sē-ē (Neo-Lat. nom. pl., from *Musa*, from Ar. *mauz*, banana tree), The Banana Family. A family of monocotyledonous plants, almost restricted to the Oriental tropics, from whence many of them have been introduced into the Occidental tropics. This is one of a group of four families which constitute the order Scitaminales (q.v.), an order intercalated between Liliales and Orchidales, at the end of the series of Monocotyledons. Although the plants resemble trees in stature, the apparent stems consist of the long sheathing bases of the leaf stalks, constituting what is called a false stem. From the midrib to the margin of the leaf blade are many fine parallel veins. Hence the wind tears the tissue between them and makes the leaves very ragged. The flowers are borne on spadices in cymes or racemes often with bright-colored bracts which are protected by spathes. The fruit is either fleshy or a three-valved capsule. The family contains about 60 species, many of which are exceedingly important for their fruit (especially species of *Musa*) and for their leaf fibres, which are used in cordage and for textile purposes. A very interesting species is the traveler's tree (q.v.) of Madagascar. See Banana; Hemp, Manila; Plantain.

MUSÆ'US (Lat., from Gk. Μουσαῖος, *Mousaios*). 1. A legendary Greek poet and personification of the powers of the Muses. His parents were said to be Eumolpus or Antiphemus and Selene, and in story he was closely connected with Orpheus, of whom he is variously called teacher, son, and pupil. He is especially associated with the Eleusinian mysteries, which he was said to have founded, and many poems apparently connected with this worship, or oracular in nature, were attributed to him. He had no existence, however, outside of legend. 2. A later Musæus, who probably flourished in the sixth century of the Christian era, was the author of a very pleasing amatory poem, in Greek, entitled *Hero and Leander*, discovered in the thirteenth century, of which the first edition was published by Aldus Manutius about 1494; critical edition by C. Dilthey (Bonn, 1874). See Hero.

MUSA IBN NUSAIR, mo͝o'sȧ ĭb''n no͝o-sīr' (c.660–c.714). An Arab governor of north Africa, who sent Tarik (q.v.) in 711 to make an expedition into Spain, which led to the Moorish conquest of the peninsula. Musa, jealous of the success of his subordinate, crossed himself in 712 with an army of 18,000 men. He made conquest after conquest, but was checked in 713 by

an order of the Caliph to repair at once to Damascus. He left immediately, his son Abdul Aziz taking command. When Musa arrived at Damascus he was deprived of his command, and is said to have been put to death, while his son met his death in his palace at Seville, possibly at the command of the Caliph of Damascus. Consult *Cambridge Medieval History*, vol. ii (New York, 1913).

MUSÄUS, mụ-zā′ụs, JOHANN KARL AUGUST (1735–87). A German writer, best known for his *Volksmärchen der Deutschen* (1782–86), a collection of tales blending genial humor, quaint fancy, and common sense. Musäus was born in Jena, March 29, 1735. He studied theology, became in 1763 tutor of pages at the court of Weimar and in 1770 professor at the Weimar Gymnasium. His literary career began (1760) with a successful parody of Richardson's *Grandison*. Then, after 18 years' silence, he satirized Lavater's whimsical theories in *Physiognomische Reisen* (1778–79). His sprightly and genial *Freund Heins Erscheinungen in Holbeins Manier* (1785) are interesting because they show the rising influence of Wieland (q.v.). He died at Weimar, Oct. 28, 1787, before completing *Straussfedern*, a series of tales. In 1788 appeared the clever skits *Moralische Kinderklapper*. Other posthumous writings were gathered in 1791 with a notice of Musäus by his pupil and relative, August von Kotzebue (Leipzig, 1791). There is a *Life* by Moritz Müller (Jena, 1867). Consult also A. Stern, *Beiträge zur Literaturgeschichte des 18. Jahrhunderts* (Leipzig, 1893).

MUSCÆ VOLITANTES, mŭs′sē vŏl′ī-tăn′tēz (Lat., flying flies); MYIODESOPSIA (Gk. *μυιώδης, myiōdēs*, like flies + *opsia*). The term applied to floating grayish spots before the eyes. Whoever will look through a minute pinhole in a card at the clear sky may see floating before his sight a number of translucent tubes or fibres, and many little beads, of which some are separate, some attached to the tubes, and some apparently within them. Some of the tubes or fibres are straight, others looped or twisted, and others again forked. All these objects are bright in the middle, and bounded by fine black lines. The doublings and crossings of the loops or knots in the twisted fibres appear as black points. Though the eye be fixed, these bodies change their position with greater or less rapidity. Now, in ordinary light and vision these objects are usually unobserved, though some persons can easily see them, especially when looking at a bright surface. They are believed to be caused by shadows cast upon the retina by cells (probably embryonic) which exist normally in the vitreous humor. They occur most often with errors of refraction and disturbances of digestion and are apt to be associated with excess of uric acid. A course of alkaline waters, together with the observance of ocular hygiene and the wearing of suitable lenses, generally affords relief. They are of no pathological importance whatever, but may become very annoying to neurasthenic patients. After a sudden movement of the eyes they appear to settle downward. Fixed black spots, not moving at all while the eyes are motionless, are suggestive of actual disease and demand an ophthalmoscopic examination.

MUS′CARDINE (Fr. *muscardine, muscadin*, It. *moscardino, moscadino*, musk lozenge, from *moscato*, ML. *muscatum*, musk, from Lat. *muscus*, musk), or SILKWORM ROT. The fungus *Botrytis bassiana* and also the serious disease of silkworms which it produces. The fungus consists of erect branching threads, with clusters of spores at the ends of short lateral branches. The spores germinate on healthy silkworms, especially those in the last stage before spinning their cocoons. They germinate also on the caterpillars of other lepidopterous insects, and on the common house fly. Diseased worms die suddenly, become discolored, and are soon hard and dry. Within 24 to 36 hours their bodies may be covered with a whitish powder, the spores of the fungus. For the prevention of this disease absolute cleanliness in the breeding house is necessary; rooms should be cleansed and fumigated after an outbreak to prevent infection of the new brood. The fungus *Metarrhizium anisopliæ* and the disease which it causes in white grubs and other insects are known as the green muscardine; and the fungus *Sporotrichum globuliferum*, which causes disease in chinch bugs, scale insects, etc., is known as the white muscardine.

MUSCARDINE. See DORMOUSE.

MUSCARINE, mŭs′kȧ-rīn. See ALKALOIDS.

MUSCAT, mŭs-kăt′. An old name for the Arabian State of Oman (q.v.).

MUSCAT, MUSKAT, or **MASKAT,** mŭs-kăt′. The capital of Oman, in southeast Arabia, situated on the Gulf of Oman (Map: Turkey in Asia (Arabia), J 6). It is fortified and has a good harbor, which makes it one of the most important commercial centres in Arabia, and the port for almost all the trade of Oman, amounting to over $6,000,000 annually. Its exports consist of dates, mother-of-pearl, dry fish, and salt. It is poorly built and unclean. Its climate is very hot and is considered by some authorities as unhealthful. Its rainfall averages four inches. The population is estimated at 24,000, including the adjacent town of Matra. The inhabitants are mainly engaged in agricultural pursuits. Muscat is the seat of a British Resident and is under British influence. In the sixteenth century Muscat was captured by the Portuguese, but was restored to the ruler of Oman in the seventeenth century.

MUS′CATEL′, or **MUSCADEL** (OF. *muscadel, muscadet*, Fr. *muscadet*, from ML. *muscatellum*, muscatel wine, dim. of *muscatum*, musky odor, from Lat. *muscus*, musk). The name given to many kinds of sweet and strong French and Italian wines, whether white or red. Among the finest are the white Rivesalt and red Bagnol wines from Roussillon, the Lunel from the Pyrenees, and the Lacryma Christi and Carigliano of Naples. See WINE.

MUSCATINE, mŭs′kȧ-tēn′. A city and the county seat of Muscatine Co., Iowa, 30 miles southwest of Davenport, on the Mississippi River and on the Chicago, Rock Island, and Pacific, the Chicago, Milwaukee, and St. Paul, and the Muscatine North and South railroads (Map: Iowa, F 3). It is built on high bluffs at a bend of the river; and among noteworthy features are the Musser Library (public), a soldiers' monument, a public park, two hospitals, and a high bridge across the river. The city carries on considerable trade in lumber and agricultural produce, being known especially for the watermelons and sweet potatoes grown on Muscatine Island, just below the city. It is an important industrial centre, its establishments including canning factories, pickle works, found-

ries and machine shops, sheet-iron, boiler, and engine works, manufactories of various lumber products, potteries, button factories, box and packing-case factories, brick and tile works, carriage and wagon shops, etc. Settled in 1833, Muscatine was incorporated first in 1839. The government, under a charter of 1851, subsequently amended by State special charter laws, is vested in a mayor, elected every two years, and a unicameral council, which controls important powers of confirmation and election in administrative offices. The police judge, treasurer, wharf master, assessor, and school board are chosen by popular vote. The city owns and operates the water works. Pop., 1890, 11,454; 1900, 14,073; 1910, 16,178; 1914, 17,074; 1920, 16,068. Consult I. B. Richman (ed.), *History of Muscatine County* (2 vols., Chicago, 1911).

MUSCHELKALK, mush'el-kălk (Ger., shell lime). The middle member of the Triassic or New Red Sandstone period in continental Europe. In Germany the formation consists chiefly of limestones, which abound in the remains of mollusca; hence the name muschelkalk. The beds are of much economic importance, containing salt, marl, and gypsum.

MUSCI, mŭs'sī (Lat., mosses). The technical name of the group of plants known as mosses, one of the two subdivisions of bryophytes, the other being the Hepaticæ (liverworts). Mosses are adapted to all conditions, from submerged to very dry, and are most abundantly displayed

FIG. 1. The so-called flower of a moss in longitudinal section, showing antheridia (*a*), archegonia (*b*), and paraphyses (*p*). Outside all are longitudinal sections of leaves.

in temperate and Arctic regions. They have great power of vegetative multiplication, new leafy shoots putting out from old ones, thus forming thick carpets and cushions. Bog mosses often completely fill up bogs or small ponds and lakes with a dense growth which dies below and continues to grow above. These quaking bogs or mosses furnish very treacherous footing. In their depths the dead moss plants become slowly modified into peat.

There are two great groups of mosses, the *Sphagnum* forms (peat or bog mosses) and *Bryum* forms (true mosses). The life history of a true moss shows a distinct alternation of generations (q.v.). When a spore germinates, there is first developed a small, green, thready body (protonema), upon which appear buds that give rise to the ordinary leafy moss plant. Upon this leafy plant the sex organs (antheridia and archegonia) are borne (Fig. 1), and hence it is the sexual phase (gametophyte) in the

FIG. 2. 1, gametophyte, showing original spore (*y*), protonema (*p*), buds (*b*) which develop the leafy branches (*s*). 2, a young sporophyte (*c*) emerging from the leafy plant (*s*).

alternating generations. The sex organs produce a fertilized egg, which upon germination does not reproduce a leafy moss plant but a structure of totally different character, viz., a stalked spore case (sporogonium), full of asexual spores, commonly called the moss "fruit." Since this sporogonium has no sex organs, it is the sexless phase (sporophyte) in

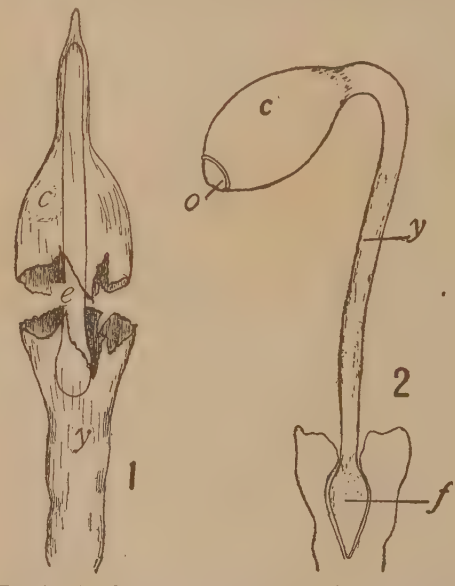

FIG. 3. 1, the young sporophyte (*e*) rupturing the bladdery archegonium and carrying up the upper portion (*c*), as a hood (calyptra). 2, mature sporophyte (sporogonium), showing foot (*f*), seta (*y*), capsule (*c*), and operculum (*o*). Both diagrammatic.

the alternation. When these spores germinate they produce leafy moss plants (gametophytes) again, and so alternation continues. (See Fig. 2.) The spore case (capsule) of an ordinary

MOSSES AND LICHENS

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1 BEARD MOSS - USNEA BARBATA
2 SAFFRON - COLORED STICTA - STICTA CROCATA
3 CRESTED CLADONIA - CLADONIA CRISTATELLA
4 YELLOW EVERNIA - EVERNIA VULPINA
5 FERN MOSS - THUIDIUM RECOGNITUM
6 TREE MOSS - CLIMACIUM AMERICANUM
7 BROOM MOSS - DICRANUM SCOPARIUM
8 HAIR - CAP MOSS - POLYTRICHUM COMMUNE
9 PEAT MOSS - SPHAGNUM SQUARROSUM

moss, generally pendent from a slender stalk (seta), is a very complicated structure. It is usually somewhat urn-shaped, with a little conical or flattish lid (operculum), which is thrown off when the spores are to be discharged. Often also the mouth of the urn is guarded by beautiful hairlike or toothlike structures which converge towards the centre and are collectively known as the peristome (around the mouth). Through the centre of the capsule there runs an axis of sterile tissue, called the columella; while capping the top of the capsule like a loose hood is the calyptra, which is the dead and ruptured female sex organ (archegonium) that has been carried up by the elongating sporogonium (Fig. 3). Consult A. J. Grout, *Mosses with a Hand-Lens* (2d ed., New York, 1905), and E. H. Hale, *Flowerless Plants* (ib., 1909). See BRYOPHYTES.

MUS'CIDÆ (Neo-Lat. nom. pl., from Lat. *musca*, fly). A family of dipterous insects comprising the typical or true flies. The bristle of the antennæ is feathery, and the abdomen is smooth except for a certain number of bristles near the tip. The larvæ as a rule feed upon decaying animal or vegetable matter, more abundantly upon the former. The group comprises many species and includes some of the most common and abundant forms, such as the house fly, the horn fly, and the stable fly (qq.v.).

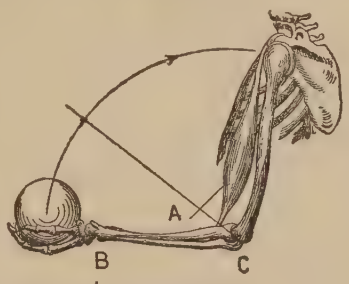
MUSCLE, DISEASES OF. Inflammation of muscle tissue is called myositis (Gk. *μῦς, μυός, mys, myos,* muscle + *itis*). It may be acute or chronic. The acute form may be due to infection or injury and sometimes terminates in suppuration. There are slight tenderness, swelling, and œdema. In trichinosis the muscles are inflamed and tender from the presence of a minute worm, the trichina. A chronic form of the disease, known as myositis ossificans, is a progressive affection, either congenital or beginning in infancy, and confined almost exclusively to the male sex. The affection is characterized by the gradual formation in the muscles, generally of the back, of masses of bone tissue; pronounced deformity results, the respiration becomes impeded, and death occurs in about 10 years. The pathology is obscure, and no curative treatment is known. A similar condition may develop after severe injury, but in this form the ultimate prognosis is good.

The voluntary muscles may become atrophied from want of use, from long-continued pressure, from injury, from interference of the blood supply, or disease of their supplying nerves or their centres in the spinal cord, as is often seen in lead poisoning or infantile spinal paralysis. (See POLIOMYELITIS.) Muscles may become contracted from disease or injury or may be dislocated as a result of accident. The long head of the biceps is most frequently displaced. Diseases of the joints, such as rheumatoid arthritis of the shoulder, may also bring this about. Other conditions which may be occasioned by injury are wounds and contusions, hernia, rupture, and strain, the latter term applying to a condition in which the muscle is unduly stretched and some of its fibres broken. Muscles may become hypertrophied by excessive use. In pseudohypertrophic paralysis the bulk of the muscle is apparently increased; but in reality there is less muscle structure than normal, the increase consisting of fat and connective tissue.

Gradual wasting of the muscles is observed in many nervous diseases. A specific form, progressive muscular atrophy, known also as wasting palsy, chronic anterior poliomyelitis, and Duchenne-Aran's disease, occurs in males between 25 and 50 years of age and in many instances is believed to be hereditary. Several etiological theories are put forward, but the ultimate causation of the disease is obscure.

The term "dystrophy" is applied to conditions of progressive muscular weakness with atrophy, in which the seat of the lesion is in the muscle itself rather than in the spinal cord or nerve fibres. Many types of progressive muscular dystrophy have been described, among which may be mentioned Erb's paralysis and Landouzy-Déjérine's paralysis, the one beginning in childhood, the other in infancy. Pseudohypertrophic paralysis is sometimes classed as a dystrophy.

MUSCLE and **MUSCULAR TISSUE** (Lat. *muscles*). While contractility is a property of



A. BICEPS MUSCLE.

all active, living protoplasm, it is in muscular tissue that this property reaches its highest development, the ability to contract along certain definite lines being the peculiar function of this tissue. Muscle tissue occurs in three different forms. 1. *Striated Voluntary Muscle.*—This form is found in all those muscles which are under the control of the will, in fact all those which in the common use of the term are called

INVOLUNTARY MUSCLE IN LONGITUDINAL SECTION.

muscles, such, e.g., as the biceps, triceps, etc. 2. *Nonstriated Involuntary Muscle.*—This form occurs in the muscles which are not under the control of the will, but which carry on the automatic functions of life, such as the muscles of the intestine, which control its peristaltic action, or the muscles of the arteries and veins, which govern their contractility. 3. *Striated Involuntary Muscle or Cardiac Muscle.*—This form is peculiar to the heart, and appears to occupy an intermediate position between the other forms of muscular tissue.

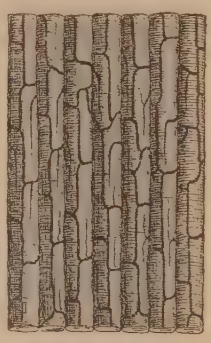
INVOLUNTARY MUSCLE IN TRANSVERSE SECTION. *Ar. t.*, areolar tissue.

1. *Striated Voluntary Muscle.*—This constitutes the ordinary voluntary muscles of the skeletal system, and occurs in the pharynx,

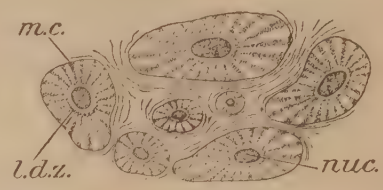
larynx, diaphragm, generative organs, etc. It is composed of long cylindrical fibres, each one of which represents a highly specialized development of a single cell. The muscle fibre consists of the muscle substance proper, the muscle nuclei, and an external sheath or sarcolemma. The muscle substance of a fibre shows a longitudinal striation which indicates its division into ultimate fibrillæ, while transversely it consists of alternate light and dark bands or disks. The light disk is crossed by a delicate dark line, the line or membrane of Krause. A light line across the dark disk (Hensen's line) has also been described, but is probably an artifact. The minute bit of muscular tissue separated off by Krause's line at either end and by the dividing line between the fibrillæ on each side is known as the sarcous element of Bowman, while the appearance presented by the crosscut ends of the fibrillæ composing a single fibre is called Cohnheim's field. Each fibre is inclosed in a transparent, very delicate, but tough and elastic sheath, known as the sarcolemma or myolemma, the former term being derived from the Greek words *sarx* (flesh) and *lemma* (skin or husk), the latter from the Greek words *mus* (muscle) and *lemma*. Just beneath the sarcolemma, in the protoplasm, lie the muscle nuclei. They are oval or spindle-shaped, their long axes corresponding to those of the fibre. The individual fibres are held together by a delicate connective tissue called the endomysium; they are bound together into bundles or fascicles by a coarser connective tissue, the perimysium; while the entire muscle is surrounded by a connective tissue sheath, the epimysium. In short muscles single fibres may extend the entire length of the muscle. In longer muscles individual fibres do not extend the entire length of the muscle, averaging 25 to 50 millimeters in length. Very long fibres, 100 to 120 millimeters long, are sometimes found. The fibres taper somewhat at their ends and terminate, if in the middle of the muscle, by a blending of the sarcolemma with the endomysium of the neighboring fibres; if in tendon, periosteum, or perichondrium, by union of the sarcolemma with the connective tissue. Striated muscle is extremely vascular. The larger vessels run in the perimysium, where they branch, and these smaller branches give off capillaries which form a rectangular network among the individual fibres. The larger nerve trunks run in the perimysium, where they subdivide and send branches to the muscle fibres. Here they terminate in special end plates. See NERVOUS SYSTEM.

VOLUNTARY MUSCLE IN TRANSVERSE SECTION.

m. f., muscle fibres; *end.*, endomysium; *per.*, perimysium.



INJECTED VOLUNTARY MUSCLE.



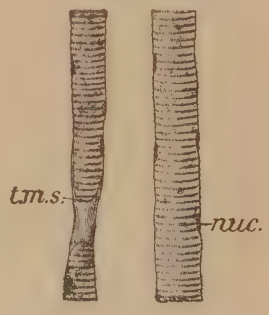
SECTION OF HEART MUSCLE (striated involuntary muscle).

m. c., muscle columns; *l. d. z.*, zone of less differentiated sarcoplasm; *nuc.*, nucleus.

2. *Nonstriated Involuntary Muscle.*—This form of muscular tissue, while not occurring in large masses, has an extremely wide distribution. It forms the muscularis mucosæ and muscular coats of the gastrointestinal canal, the muscular walls of the arteries and veins, of the trachea and bronchi, of the larger ducts of glands, and occurs in the urinary tract and in the male and female generative organs. It consists of long, slender, spindle-shaped cells from .075 to .230 millimeter in length and from .004 to .010 millimeter in thickness. Its substance shows fine longitudinal markings. A delicate sheath or cell wall has been described and within this is the semifluid granular protoplasm of the cell body. In the centre of the latter lies a long rod-shaped nucleus towards each end of which a few fine granules are found. These cells are arranged in bundles, the individual cells being held together by a cement substance, the bundles being surrounded by connective tissue. Blood vessels ramify in this connective tissue, where they break up into capillaries which form a network among the muscle cells. Nerves, mainly of the sympathetic system, pass to the individual muscle cells.

INVOLUNTARY MUSCLE.

Smooth muscle fibres from the small intestine of a frog.

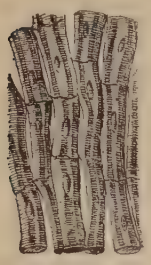


VOLUNTARY MUSCLE.

nuc., nuclei; *t. m. s.*, termination of muscular substance.

3. *Striated Involuntary Muscle* (*Cardiac* or *Heart Muscle*).—This is a type of muscular tissue peculiar to the heart. It resembles the smooth involuntary muscle in being composed of nucleated cells. These cells are, however, much larger and broader than the smooth muscle cells, are more or less rectangular in shape, and send off lateral branches which join similar branches of neighboring cells, with which they are connected by cement substance. The cell

protoplasm shows both longitudinal and transverse striations, but much less marked than in striated voluntary muscle. A cross section of a cell gives somewhat the appearance of Cohnheim's field, but the fibrillæ show a more or less radial arrangement about the circumference. The nucleus is round or slightly oval in shape and is situated near the centre of the cell.



HEART MUSCLE.

Development. Muscle is developed from the mesoderm or middle layer of the embryo. Smooth muscle cells are produced by a differentiation of mesodermal cells. Voluntary striated muscle is developed by a still further specialization of these mesodermal cells, the nuclei proliferating and longitudinal and transverse striations appearing in the protoplasm. In this way the cells become gradually transformed into the fibres of voluntary muscle. Heart muscle has the same derivation, and represents an intermediate stage of development between the more primitive smooth muscle cells and the more highly specialized striated muscle fibres. For diseases, see MUSCLE, DISEASES OF.

MUSCLE READING. The intuition of a person's thought by physical contact. Every complete mental process tends to issue or express itself in movement; the psychophysical organism is essentially a motor organism. In many cases these expressive or concomitant movements are involuntary and unknown to their performer. It is often possible, by close attention to them, to get an inkling of the object or direction of the agent's thought. Some persons, indeed, have a peculiar aptitude for this muscle reading, or (as it has been wrongly termed) mind reading, so that they are able, by taking into account all the objective indications presented by the agent, to reproduce in somewhat surprising detail the course of his thought.

Muscle reading was much in vogue a few years since as a drawing-room game. On the stage it is customary for the mind reader to lay the hand of the subject upon his forehead or to take the subject's hand in his own. By minute observation of the subject's involuntary movements, of his tremor or flush of excitement, etc., it is possible for the reader to guess, in many instances, the number of a watch, the place and character of a hidden object, etc.; the subject being completely unaware that he is giving any suggestion, and the suggestions themselves being unnoticeable to the audience. With the most successful mind readers the process of observation has itself become habitual and therefore partly unconscious, so that they are unable to explain their modus operandi, even if they desire to do so. Their extreme fatigue, at the conclusion of a performance, indicates, however, that attention has been under great strain.

This appreciation of unconscious movements and of vasomotor changes in the subject is sufficient to explain all the feats of mind reading that are on record, surprising as some of them may appear. Consult Preyer, *Die Erklärung des Gedankenlesens* (Leipzig, 1886), and Joseph Jastrow, *Fact and Fable in Psychology* (Boston, 1900).

MUSCLE SENSE. Historically, a sixth sense, supposed to furnish in connection with the movement of voluntary muscle a specific quality, directly concerned in the perception of position and movement of the bodily frame and less directly in the perception of space at large. Experimental psychology has shown, however, that special sense qualities arise not only from the muscles but also from the tendons and from the structures about the joints, and that movements of the head or of the body as a whole give rise to still other qualities, those of the static sense (q.v.). To all these qualities taken together the term "kinæsthetic sensations" is at present applied, and the term "muscle sense," except in an historical context, has tended to fall into disuse.

In consequence of the inaccessibility of the end organs and of their spatial contiguity with one another and with the cutaneous endings, kinæsthetic sensations cannot easily be isolated for study. They seem, furthermore, to possess a textural similarity to one another and to cutaneous pressure, and a tendency to fuse readily together into complexes, so that their individual recognition is especially difficult. If, however, the position of the arm be kept constant, so that there is no change of articular conditions; if the skin and subcutaneous tissue be anæsthetized by ether or by a cocaine injection; and if the body of the muscle be then pressed, or stimulated by an electric current, the specific sensation of voluntary muscle may be experienced. With moderate intensities of stimulus the sensation is a dull, dead, diffuse pressure, most nearly akin to pressure sensations obtained by pressing a blunt object lightly upon the normal skin; with stronger intensities the sensation has a dragging or grinding character, presently becomes sore and achy, and finally merges into dull pain. The sensation with these higher degrees of intensity seems to be the characteristic part of the feeling of fatigue.

Less complete isolation is possible in the case of tendinous and articular sensations. Articular sensations may be approximated if we bend the hand with relaxed fingers slowly and evenly about the wrist, ruling out or abstracting so far as possible from the cutaneous sensations and attending to the sensation complex localized within the wrist joint. Under these conditions the complex is distinguishable from the dull, dead muscular quality. The impression is very like that obtained by turning a soapy finger within the loosely shut other hand; i.e., is like cutaneous pressure over a considerable area. Analysis of a number of other experiences, such as those of severe muscular work, of supporting or lifting a heavy weight, of tightly clenching the fist, or even of expectant attention, brings to light a third quality which we term effort or strain. The sensation seems to have its origin in the tendon. It is more lively, thinner, more definite and cleaner-cut than muscular pressure; it is also distinguishable from cutaneous and articular sensation. Like the dragging sensation of the muscles, it takes on the character of dull pain with higher intensities of stimulus.

The assignment of nervous end organs to the above-mentioned qualities must remain at present a matter of probability rather than of certainty. Medullated fibres ending in the substance of the muscles take on differentiated forms known as the muscle spindles. The ten-

dons contain similar structures, known as the spindles of Golgi. Pacinian corpuscles and histologically related bodies are widely distributed. They are especially plentiful in muscle and tendon fascia and in the synovial membrane and ligaments of the joints; they are also found in adipose tissue, in the periosteum, in the body of the tendons and muscles, in the walls of blood vessels, and elsewhere. Sensory nerve endings occur, further, in the substance of the bony tissue. Considerable evidence exists for assigning the dragging and achy sensations of the muscle to the muscle spindles, and the sensation of strain to the spindles of Golgi. The Pacinian corpuscles appear to be connected with articular pressure. If they are differently tuned, as the pressure and temperature organs of the skin appear to be, it seems probable that when intensely stimulated they may also be responsible for dull muscular pressure.

As already mentioned, kinæsthetic sensations do not ordinarily appear alone, but fuse with one another and with other sensations in the form of perceptions; and they appear to be especially prominent in the perception of bodily movement. The relative importance in this perception of the various qualities mentioned, however, is at present a matter of some dispute. On general principles it seems hardly possible that muscular and tendinous sensations can play the leading part, simply because movements of equal range and like direction are constantly made with very different conditions in these parts,—with the limb flexed or extended, free or heavily weighted,—so that variations in the intensity of the sensations there aroused can hardly serve as unambiguous cues. Experimental and pathological variations seemed also, at first, to argue for the undivided importance of articular sensations. If articular sensitivity was impaired, the perception of movement was blunted; and if with impaired sensitivity articular stimulation was increased in intensity, the perception was sharpened; whereas muscular and tendinous sensations might, apparently, be ruled out without decreasing the accuracy of perception. More recent experiments, however, appear to indicate that, at least under normal conditions, the other kinæsthetic qualities and cutaneous sensations may furnish subsidiary cues whose absence results in decreased accuracy of perception. With the normal forearm laid passively on a board hinged beneath the elbow, e.g., it is found that we are able with closed eyes to appreciate a gentle movement of the arm through an arc of as little as $\frac{1}{200}$ of a degree. If the skin is anæsthetized, however, the movement must be about a hundred times as great in order to be perceived. In general, experiment tends to show that external pressures upon the skin and distentions and other movements of the skin brought about by movements of the subcutaneous tissues are normally of great importance in our estimation of the rate, range, and direction of movement. It appears, furthermore, in experiments with the elbow board, that a faradizing current passing through the wrist, and apparently anæsthetizing the sensory endings in the muscles and tendons there attached, may be as effective in impairing the accuracy of perception of movement about the elbow as a current passed through the elbow joint itself. Still other experiments upon active movement, upon the after image of movement, and upon movement illusions in the limbs, tend to show that patterns of muscular and tendinous sensations may sometimes become important in this perception.

MUSCLE SENSE IN ANIMALS. See KINÆSTHETIC SENSATIONS IN ANIMALS.

MUSCLE SHOALS. The location of a dam and power development on the Tennessee River about 37 miles up stream from Florence, Alabama. This project to develop power and at the same time facilitate the navigation of the Alabama River came into general prominence during the World War. The "National Defence Act" of 1916 authorized the establishment of a nitrate plant in order to meet the government's needs for military explosives. The construction of the Wilson Dam, (Dam No. 2 of the complete project), was directed by the President, February 23, 1918, and some $17,385,000 was allotted for its construction. By 1922 it was about two thirds finished. In April, 1921, increased interest was aroused in the matter by the proposal of Henry Ford, to take over the dam and power plant and use it as the basis of a large industrial development. Mr. Ford's proposal was rejected by the Senate Committee, and up to August 1, 1922, no decision on the matter had been reached.

MUSCOGEE. See MUSKOGEE.

MUSCOGEE INDIANS. See CREEKS.

MUS'COVITE. A very common mineral of the mica group, which is in composition a hydrous potassium-aluminium silicate and which crystallizes in forms of the monoclinic system. Its usual color ranges from gray to brown, but it also occurs in different shades of green, violet, yellow, and sometimes rose red. It has a vitreous lustre that is more or less pearly or silky, and its specific gravity is from 2.76 to 3. Muscovite is one of the essential constituents of granite, gneiss, mica schist, and certain other rocks. It is widely distributed in nature, occurring most abundantly in Tirol, Styria, on the St. Gotthard, and elsewhere in Switzerland, as well as at Paris, Me., Grafton, N. H., Chesterfield, Mass., and numerous localities of North Carolina, in the United States. The fact that it has a cleavage parallel to the base, and is easily separated, forming thin elastic plates which are transparent to translucent, led to its use as the material for window panes in Russia, whence its name of *Muscovy glass*, and to its extensive and similar use in stoves under the misleading name of isinglass. It is also employed commercially in wall paper, as a filler, in electrical machines as an insulator, and to a certain extent as a paint. See MICA.

MUS'COVY. A name formerly applied to Russia, whose capital down to the beginning of the eighteenth century was Moscow.

MUSCOVY DUCK (corrupted from *musk duck*). A large South American duck (*Cairina moschata*) in which the male is much larger than the female and has fleshy wattles on the forehead and lores and a crest of long feathers. This duck has long been domesticated in Brazil and in Europe, where it is especially in favor in Germany. In the United States they are less esteemed, because of their quarrelsome nature and ability to harm one another or their companions in the poultry yard. Two varieties are recognized, colored and white, which are thus described in Howard's *Farmers' Bulletin, No. 64*, of the United States Department of Agriculture (Washington, 1897): The head of the colored muscovy is glossy black and white; the bill is

dark horn in color; eyes, brown; the back in color of plumage is lustrous blue black, which is sometimes broken with white; the color of the breast and body is the same as that of the back. The wing coverts are rich, lustrous green black, and the tail feathers may be either black or white, the latter being preferred. The thighs, like the tail feathers, may be either black or white, white being preferred; the shanks, toes, and webs vary in color from yellow to dark lead or black. The white muscovy in color of plumage is pure white throughout; feathers of any other color will disqualify the bird for show purposes. The eyes in the white variety are of a leaden-blue or gray color, while those of the colored are brown. The shanks, toes, and webs are of a pale-orange or yellow color. The standard weight of the adult drake is 10 pounds; adult duck, 8 pounds. The flesh is good and loses in cooking the musky odor of the living bird. See DUCK.

MUS'CULAR FORCE, ORIGIN OF. This subject has occupied the attention of physiologists for many years, and numerous theories have been offered to explain the phenomena of muscular energy. The older observers, represented by Liebig, held that nitrogenous food went to build up and maintain muscular tissue and that energy was evolved in the oxidation of this class of food, the waste being represented in the excreted urea. The nonnitrogenous foods (carbohydrates and fats) were supposed to be entirely devoted to the production of heat. Muscular work should therefore cause a distinct increase in the elimination of urea. But this theory is invalidated by the fact that the excretion of urea does not keep pace with the production of energy. Later observers have taken the opposite view, that force is generated by the oxidation of nonnitrogenous substances, and that the nitrogen constituents of muscle are rather to be looked upon as forming a part of the machine in which the former substances are burned than as constituting the fuel themselves.

Herman holds that muscular activity depends upon the splitting up and subsequent re-formation of a complex nitrogenous body which he calls *inogen*. From the decomposition of this body there result carbon dioxide, sarcolactic acid, and a gelatino-albuminous body. Of these the carbon dioxide is carried away by the blood, and the acid and the albuminous substance, at least in part, go to rebuild the inogen. The other materials of which the inogen is formed are supplied by the blood. Of these materials oxygen and some carbohydrate substance form a part. The decomposition takes place both in resting and active muscle, but is much greater in the latter. This theory explains certain known facts of muscular metabolism: that muscle absorbs oxygen and gives off carbon dioxide during both rest and activity, and that increased exchange of these gases takes place during the latter condition; that this process is attended by the production of heat; and that muscle during rest produces nitrogenous crystallizable substances such as creatine from the metabolism going on constantly during life.

Greene thus sums up what is at present really known as to chemical changes in contracting muscle: 1. The alkaline muscle becomes acid from the presence of sarcolactic acid. 2. The muscle gives out carbon dioxide and takes up oxygen, but the amount of the carbon dioxide given out is not entirely dependent upon the oxygen taken in, and must arise partly from some other source. 3. Certain imperfectly understood chemical changes occur, probably connected with the foregoing phenomena, in which glycogen is converted into dextrose and the latter oxidized.

For a full discussion of this subject, see Michael Foster, *Textbook of Physiology* (new ed., New York, 1904), and W. S. Kirke, *Handbook of Physiology*, revised by C. W. Greene (8th ed., ib., 1914). See also PHYSIOLOGY.

MUSCULAR RHEUMATISM. See RHEUMATISM, MUSCULAR.

MUSCULAR SYSTEM, EVOLUTION OF. The muscular system comprises those tissues or masses of tissue which have the property of contractility and whose function it is to accomplish the movements of the parts or of the whole of the animal body. Contractility is one of the properties of simple protoplasm. Thus, the amœba progresses by the extension of some portion and the contraction of other parts of its body. The cortical layer of *Paramœcium* is a specially contractile region in the protoplasm. In the *Stentor* and the stalk of *Vorticella* there are protoplasmic differentiations that resemble muscle fibres.

Many of the outer-lying ectoderm cells of *Hydra* show considerable differentiation; they are conical in shape, with the broad surface outward. On this external surface a thin, cuticle-like layer has been demonstrated. Internally the cell ends in a contractile basal portion or process which lies parallel to the long axis of the body of the hydra and between the ectoderm and entoderm. The whole of these cells are contractile, but the long processes are specially so. These processes were formerly known as neuromuscular, but with the discovery of special nerve cells the muscular function alone must be conceded to them. Like the muscle cells of vertebrates they contract when properly stimulated. Here, then, are ectodermic muscle cells, the entire protoplasm of which, like that of the amœba, is irritable and contractile, but with a portion of the cell more clearly set apart to perform the contractile function than in any protozoan. In the jellyfishes, such as *Aurelia*, a muscle cell is likewise composed of two parts—a contractile portion (which shows cross striations) and, attached to the striated portion, a protoplasmic, nondifferentiated, noncontractile portion which may bear cilia on its external surface. This muscle-bearing epithelium is arranged in a bundle or ring around the edge of the subumbrella. It is the contraction of this muscular zone that propels the jellyfish through the water. In the tentacles and about the lips unstriated muscle fibres occur. The contraction and extension of the body of the sea anemone, as well as of its gullet and mesenteries, and its ability to move slowly from the point of attachment, are accomplished by means of a well-developed muscular system. This consists of bands of longitudinal muscle fibres which run on the mesenteries from the base to the disk; of parietal muscles which pass obliquely across the lower and outer angle of the mesentery; and of a thin sheet of transverse muscles. The contraction of the longitudinal muscles draws the animal towards the base, and that of the transverse muscles causes the contracted animal to extend again. A band of circular muscles at the junction of column and disk causes the disk

and contracted tentacles to be inclosed within the body of the anemone. In addition to the bands of muscles, scattered fibres occur both in the body wall and in the gullet, which consist partly of spindle-shaped, nucleated fibres and partly of such striated muscle processes as occur in *Hydra*. The latter are mostly found in the transverse muscles of the body and the tentacles, and are of entodermal origin, as also are the muscle bands of the mesenteries. Other longitudinal muscles are of ectodermic origin. Some of the muscles, however, sink so far down into the middle layer or mesoglea as to seem to belong to it alone. This is significant because all the musculature of animals above the cœlenterates lies between the ectoderm and entoderm.

The musculature of flatworms falls under two groups: (1) the dermal musculature and (2) the dorsoventral musculature. The dermal musculature lies either under the basal membrane of the epidermis or under the cuticle. It is composed of distinct layers. In each layer all the fibres run in one and the same direction. There are longitudinal muscles, transverse and diagonal muscles. The musculature is stronger on the ventral creeping surface. In cestodes the diagonal layer is replaced by a second circular layer. The dorsoventral musculature runs from the dorsal to the ventral surface, and is much displaced at sexual maturity by the male and female germ glands. Below the cuticular layer of roundworms there is a well-developed muscular layer in the form of a tube, and composed of outer circular fibres and inner longitudinal ones. This muscular tube effects the writhings and undulations of the body. As in the cœlenterates, the muscle element is composed of a single cell, made up of a protoplasmic (often glandular) portion and a fibrillar part. The fibrillæ rarely show any evidence of cross striation, the lateral lines are free from muscle fibres, and the longitudinal sheet is thus broken up into bands.

The muscular system of mollusks is also well developed. The muscle fibres, both of bivalves and gastropods, are all of the unstriated sort, because of the slow movements of the animals. These fibres occur usually in distinct bands or sheets, and frequently are combined for greater power to form very large muscles, such as the two abductors of *Anodonta*, which close the shell. Other important muscles are those of the foot, including two protractors and one retractor; and in the snail those that work the radula of the mouth, the retractors of the horns and penis, and those that pull the head into the shell. The muscles are fastened to the shell, upon which they make certain distinct markings at the points of attachment, called scars.

The musculature of segmented worms, like that of the roundworms, is composed of a dermomusculature tube which is composed of an outer circular and an inner longitudinal layer of fibres. The fibres are in the form of bands. The pharynx, mouth, gut, parapodia, and septæ have special muscle fibres. In leeches, in addition to the circular and longitudinal bands of muscle fibres, there are bands reaching diagonally from the dorsal to the ventral surface of the body.

Among arthropods the musculature of the Crustacea is well developed and very complex, but there is little evidence remaining of the dermomuscular tube of worms. It is assumed that the dorsal and ventral pair of longitudinal muscles correspond to the four similarly situated bands of muscle in the Polychæta. Perhaps traces of the circular musculature of annelids are found in the muscles that are attached to the basal parts of the appendages on the one hand and to the integument of the body on the other. Certainly the firmer exoskeleton makes greater localization of the musculature possible. In the limb-bearing portion of the abdomen and the thorax there are paired dorsal and ventral muscle bands. In the limbless part of the abdomen there is a thick layer or tube of longitudinal muscle fibres, interrupted at each septum by the connective tissue that separates the myomeres. Thus the muscle itself is separated into myomeres. The abdomen is bent upward, downward, or sidewise by the contraction of the muscle fibres in the corresponding portion of the body. The appendages are moved by muscles that pass out into them from the trunk. The muscles are either attached to the cuticular outer covering or to inward projecting parts of it, and often terminate in sinewy pieces that are white and are composed of bundles of cross-striated fibres—the kind of fibre that characterizes all rapidly moving muscle. In *Peripatus*, however, the muscles are unstripped, save those which work the jaws. In insects, the thorax and metathorax, as in the case of the grasshopper, are crowded with leg and wing muscles. In the cockroach, where the wings are little used, the wing muscles are poorly developed.

The musculature of *Amphioxus*, like that of the abdomen of Crustacea, is divided into metameres. Of these muscular segments or myomeres there are about sixty, V-shaped on surface view, with the apex of the V extending forward. The myomeres are composed of striated muscle fibres which extend longitudinally and are attached to the septæ immediately in front and behind them. The myomeres of the two sides alternate. The musculature of the dorsal wall is the thicker.

In cyclostomes, as well as in *Amphioxus*, the muscles of any myomere are attached to the anterior and posterior myocomata of that segment. In selachians a significant change has occurred—the first step towards the complicated conditions of higher vertebrates. Certain of the ventral lateral muscles on either side of the median line become differentiated from the others, in that their fibres move out from the general level in correspondence with their greater functional activity. Thus, while the dorsal trunk muscles retain their primitive character, the ventral muscles have become separated into two masses: a pair of strong mid-ventral ones which are known together as the rectus abdominis, and the remaining muscular mass. We next find that in this latter mass the direction of the muscle fibres, which in *Amphioxus* and cyclostomes is horizontal, has become in selachians oblique; so that, from the mid-ventral line, they pass dorsoposteriorly. The remaining less differentiated portion of the ventral musculature is known as obliquus abdominis, or oblique abdominal muscle. Two kinds of changes have now occurred in the vertebrate musculature: (1) There is the functional differentiation of parts of muscles by which they become cut off from the remainder, and (2) changes in the direction of muscle fibres by which originally axial muscles have become oblique. In the lowest vertebrates the anterior and posterior ends of muscles are attached to the adjacent myocomata.

With the development of ribs from the fibrous tissue of the myocomata, muscular attachment has, in part, fallen upon them. The derma, indeed, is differentiated from the same tissue as the myocomata; hence it is not surprising that, in the migrations on the ends of muscles to adapt themselves to the new conditions, we find that some muscles are attached to the derma. Finally, some muscles, whose ends come thus to lie outside of the myomeres, may extend alongside of several somites without signs of metamerism. Thus, by these simple modifications, we gain the complex musculature of the higher vertebrates, where there are trunk muscles of different sizes and lengths, often without metamerism and attached to bony parts such as ribs, or to the skin. In *Amphioxus* the myomeres are arranged with reference to the sagittal plane from which they extend obliquely outward and backward. In cyclostomes the obliquity is so great that the myomeres overlap each other like the shingles on a roof, so that a cross section of the body may cut three or four myocomata on each side. In many fishes the free edge of the myocomata, as it appears at the surface, is not merely bowed, but is zigzag.

The most typical condition of the amphibian musculature is shown in Urodela. The dorsal lateral muscles retain most nearly the fishlike condition and lie in metameres. When the ribs and transverse processes of the vertebræ become developed some of the muscles gain attachment to them, and thus give rise to the intercostal and intertransversal muscles. The ventral lateral muscles of fishes are disposed in two regions. In Amphibia they comprise four regions, derived from a migration and splitting of the two lateral muscles of fishes. In addition, lying under the internal oblique, there is a muscle that probably has no representative in fishes. It is unsegmented and lies deeper than the skeleton and immediately within the peritoneal lining of the body cavity. The Anura differ from the Urodela chiefly in the absence of the transversal abdominis, and in the diminution or disappearance of myocomata in the adult.

In reptiles, as in Amphibia, the dorsal musculature retains more nearly the primitive condition. With the ossification of the skeletogenous tissue and the consequent attachment of the muscles to the bone, has come about the differentiation of the so-called interspinales, semispinales, intertransversals, longissimus dorsi, and others. The last-named muscle is to be regarded as a part of the dorsal musculature that has lost its metamerism, and now passes from the pelvic girdle to several of the spines of the thoracic vertebræ. The ventral musculature has become still more complicated, owing, according to Wiedersheim, to the changed rhythmic method of respiration, controlled through the more and more greatly developed lungs. To meet the needs of respiration the ribs must be moved. The muscles which perform this function have become more powerful in that the ribs have become buried in them. The musculature of successive myomeres, which projects outside or inside the ribs, becomes united into a single sheet. With the disappearance of the ribs in the lumbar region of reptiles a modification of the intercostals must of course take place. A continuous muscle is developed between the last rib and the pelvis.

The phylogeny of many of the muscles of mammals is not known. The more important muscles resemble those of reptiles.

Two kinds of muscular fibres are found in the vertebrate body. All the quickly moving voluntary muscles are composed of striated fibres. The involuntary muscles are unstriated. The muscle fibre of vertebrate muscle, like that of invertebrates, is formed by the differentiation of a muscle cell. Only in the muscle cell of the lower invertebrates a much smaller portion of the cell is transformed into fibre structure than is the case in vertebrate muscle fibre. The differentiated portion of vertebrate muscle fibre is composed of fibrillæ and forms the main bulk of the cell. The fibrillæ are embedded in the undifferentiated part, which also surrounds them in the form of a sheath and contains the nuclei.

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MUS'CULUS, Wolfgang (properly Müslin) (1497–1563). A German reformer and theologian, born at Dieuze in Lorraine. At 15 he entered a Benedictine cloister at Lixheim, but left in 1527, having been turned to Protestantism by Luther's writings. In 1531 he became pastor at Augsburg, and for seventeen years was prominent in that city. Musculus was long an eager partisan of union between the Lutheran and Reformed churches and took part in the Wittenberg Agreement (1536), and in the colloquies of Worms and Ratisbon (1540–41). At the time of the Augsburg Interim (1548) he went to Switzerland, and in 1549 became professor of theology at Bern. His views were more strongly Calvinistic in his later years, and with Calvin and Vermigli he may be reckoned as a leader of the sixteenth-century Reformation. Consult Grote, *W. Musculus* (Hamburg, 1855).

MUSÉE, mụ'zā' (Fr., museum). The first part of the names of a number of museums in Paris, of which the most important are: 1. Musée Carnavalet, devoted to Parisian history and archæology, occupying a mansion on the Rue des Francs-Bourgeois formerly known as the Hôtel de Ligneris, begun in 1544 by P. Lescot (q.v.) and extended 1660 by N. F. Mansart (q.v.); with two fine courts, and sculptures by Jean Goujon. 2. Musée de Cluny (see Cluny, Hôtel de). 3. Musée Galliéra, devoted to municipal art and temporary exhibitions: a handsome modern building and court by Ginain (1888) on the Rue Pierre Charron. 4. Musée Guimet, a museum of Oriental art and religions, on the Place d'Iéna, founded by the late Émile Guimet of Lyons. 5. Musée du Louvre (see Louvre). 6. Musée du Trocadéro or Musée de Sculpture Comparée, a vast collection of casts of historic masterpieces of sculpture in the wings of the Trocadéro (q.v.) Palace.

MUSÉE SOCIAL, sō'syàl' (Fr., social museum), The. An organization whose object is to furnish the public with information regarding movements having for their aim the improvement of the moral and material situation of the laboring classes. It resulted from the interest in the social science exhibition at the Paris Exposition of 1889, but was not formally

inaugurated until March 25, 1895. The Comte de Chambrun gave the institution an endowment of over 2,000,000 francs. Special collections of all matters pertaining to labor, trade-unions, old-age pensions, housing reform, etc., are made and indexed for ready reference. Studies of labor conditions in various countries have been undertaken, and the results published in monographs. Although young, the Musée has proved of great usefulness. It was very active in preparing the excellent exhibit of social economy in the Exposition of 1900. The more important publications of the Musée are contained in the *Bibliothèque du Musée Social*. It issues a small monthly "circulaire" containing general matter pertaining to labor.

MUSES (Lat. *Musa*, Gk. Μοῦσα, *Mousa*). In Greek mythology, the inspirers of song and music. In the Homeric epic their personality and number are vague, the poet now invoking but one Muse, now a number; only in a very late passage in the *Odyssey* are nine mentioned. In Homer, again, they are divine singers, dwelling on Olympus, and singing at the heavenly banquets; since they see and remember all things, they can inspire the bard. In the *Theogony* of Hesiod, 77 ff., the canonical number, nine, and the separate names appear. Originally probably nymphs of fountains on Mount Olympus, they seem to have been worshiped first in Pieria, whence the cult spread southward and established itself on Mount Helicon at Ascra, and in Thespiæ. We hear of shrines also at Delphi and at Athens, both on the Ilissus and on the Museum Hill, which thus obtained its name. They always loved fountains, e.g., Castalia, Aganippe, Hippocrene. There are grounds for believing that, like the Charites and the Horæ, the Muses were originally three, but nine was their number on Helicon, and this became universally accepted, as well as the tradition that they were the daughters of Zeus and Mnemosyne (Memory). In art the Muses are frequently represented. On the François vase, an Attic work of the early sixth century B.C., they appear at the marriage of Peleus and Thetis, with Calliope playing on a Pan's pipe at their head. Later artists used them freely, especially in connection with Apollo, or with the mythical poets Orpheus and Thamyris. On the basis by Praxiteles at Mantineia they are represented as present at the contest between Apollo and Marsyas. It is to be noted, however, that, while there is a tendency to develop definite artistic types for some of the figures, the division of the several branches of poetic art among the Muses and the adoption of fixed attributes to distinguish them is a product of a comparatively late period in the Roman Empire. Even the Hesiodic names did not designate the functions of the Muses, and in the popular usage seem to have been but little employed. The functions of the Hesiodic Muses were thus assigned in the later writers: Clio, history; Calliope, epic poetry; Polyhymnia, sacred hymns; Euterpe, music of the flute, lyric poetry; Terpsichore, melic poetry and the dance; Erato, the choral lyric; Melpomene, tragedy; Thalia, comedy; Urania, astronomy. The Romans identified the Greek Muses with their own Camenæ (q.v.). Some variations in this classification are found. Consult: H. Deiters, *Ueber die Verehrung der Musen bei den Griechen* (Bonn, 1868); O. Bie, *Die Musen in der antiken Kunst* (Berlin, 1887); the article "Musen" in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. ii (Leipzig, 1890–97); Arthur Fairbanks, *The Mythology of Greece and Rome* (New York, 1907). See also the articles on the individual Muses.

MUSES' LOOKING-GLASS, THE. A play by Thomas Randolph published in *Poems with Muses' Looking-Glass and Amyntas*, 1638. An altered version, entitled the *Mirrour*, appeared in 1758.

MUSEUM, mū-zē'ŭm (Lat. *museum*, from Gk. *μουσεῖον, mouseion*, temple of the Muses, place for study, museum, from Μοῦσα, *Mousa*, Muse). An institution for the preservation, study, and exhibition of objects of art or those of natural origin. The term was originally applied to a place or temple sacred to the Muses, but a little later was bestowed on institutions for the pursuit of the higher branches of learning, such as art and philosophy, the first recorded use of the word for this purpose being the famous *Museum* of Ptolemy Soter at Alexandria. The application of the word to institutions for the preservation and exhibition of works of art or specimens of natural history is comparatively recent, as are the institutions themselves, and seems to have come into vogue with the systematic gathering of objects for public exhibition. Such collections were originally known as cabinets; and while the term was to some extent restricted to small private collections, it was also given to many of very considerable size, such as the State Cabinet of Natural History at Albany, N. Y.

The germ of the modern museum has been thought by some to lie in votive offerings placed in pagan temples or deposited in churches, and in objects of sacred or historical interest preserved in churches and monasteries. And it may be said that one of the earliest references to the preservation of specimens of natural history is the account of the skins of what are now supposed to have been gorillas brought home by Hanno and presented by him to the Temple of Astarte in Carthage. Museums of art and of natural history had their origin in collections made by the rich and powerful without at first a more definite purpose than to gratify their own pleasure or curiosity. Somewhat later men of science gathered material to further their own special lines of research, and many of these private collections eventually developed into public museums. Thus some of the national museums of Europe had their beginnings in collections made by former sovereigns, while the British Museum grew out of the cabinet and library of Sir Hans Sloane. The Ashmolean Museum, at Oxford, England, was the result of the labors of Elias Ashmole, who began collecting in 1667, while the Museum of the Royal College of Surgeons, London, is based on the anatomical material gathered by the famous surgeon John Hunter, and the Hunterian Museum of the University of Glasgow was founded by his brother, William Hunter. It may be of interest to note that the exploration of America did much to promote the growth of museums and that the cabinets of Sloane and Ashmole, particularly the latter, comprised many specimens from the New World. Incidentally, too, public houses may be credited with some slight share in the development of museums; for, in England at least, they formed small collections of curiosities to attract visitors, and Artedi, in his work on fishes, mentions three taverns where

he had seen specimens of American fishes. Directly related to these, and representing another stage in the development of museums, was the establishment of miscellaneous collections, more or less scientific in their nature, to which visitors were admitted upon the payment of a fee. President Adams mentions a collection of this sort in Norwalk, Conn., formed by a Mr. Arnold prior to the Revolution, but the best of the type in America were those of the Peales in Philadelphia and Baltimore. Two noteworthy foreign collections were those formed by Sir Ashton Lever, at Manchester, in 1775, and by William Bullock somewhat later at Liverpool. These were eventually taken to London, where they flourished at different periods, and their importance may be inferred from the fact that when these collections were sold various foreign museums sent representatives to attend the sale. Such large private establishments were the immediate precursors of the present state and governmental institutions. These represent the general acknowledgment of the value of museums, and are held to mark a stage in the progress of civilization beyond that of the art gallery or library, since the development of science is far later than that of art or literature.

Great public museums are of comparatively recent date, for while Bacon in his *New Atlantis* outlines such an institution, the establishment of the British Museum in 1753 was the first realization of this idea. In 1789 France transformed a royal into a national collection by opening the Louvre to the public, but the United States did not formally establish a national museum until 1876, although it practically came into existence in 1846, when the Smithsonian Institution was made the custodian of the national collections. The influence of the many expositions held during the latter half of the nineteenth century on museums has been very great; the construction of the first building for the United States National Museum was a direct result of the Centennial Exposition of 1876, and the Field Museum of Natural History, Chicago, owes its origin to the exhibition of 1893. The South Kensington Museum, now called the Victoria and Albert Museum, in London, the Ethnological Museum of the Trocadéro in Paris, and the Glasgow Art Gallery and Museum are largely due to similar causes.

The development of museums has not merely been in their size and number, but in their scope and functions as well. Originally the specimens exhibited comprised the greater or more important portion of the collections, and were mainly for the benefit of men of science. The modern plan, especially in museums of natural history, is to restrict the number of pieces on exhibition and to select for this purpose those of the greatest educational value; the bulk of material is placed in the reserve series, and is kept thus not merely for study, but for its better preservation, since light is one of the greatest enemies of museum specimens. The constantly increasing size of collections has had something to do in shaping this policy, but it is largely the result of a recognition of the fact that, so far as the general public was concerned, the educational influence of museums depended more on the quality of the things exhibited than on quantity. This has led to careful study of the best methods of arranging and labeling objects on exhibition and so displaying them that they may attract and interest even the casual visitor. No man probably had more to do with bringing about this state of affairs than the late Sir William Flower, Director of the Museum of the Royal College of Surgeons, and subsequently of the British Museum, while in the United States Dr. G. Brown Goode (q.v.) stands preëminent among those who have been most instrumental in making museums instructive to the public. There has been a corresponding evolution in the publications issued by museums, in making them of interest to the general public and not restricting them to papers of a technical nature. We have seen that private collections were formed not only for the preservation of material, but for its study, and this led to the publication of information thus acquired. The germ of museum publications, however, is to be found in the illustrated descriptive catalogue of small private "cabinets." The oldest of these works is that issued by Gesner in 1565, describing one of the first systematic collections, that of Johann Kentmann of Dresden. Public museums have followed the same path as private collectors; and while, like individuals, their publication was at first through the medium of scientific societies, the tendency is for museums to become their own publishers. As the transfer of great collections from private to public ownership made them accessible to a greater number of students than before, this in turn has led to the issuing of memoirs by other than regular members of their staff. Many museums also issue guidebooks, handbooks, or articles of a somewhat popular nature relating to their collections, and in line with this are courses of lectures on topics illustrated in the various departments of the institution. The steady trend of museum development has been in the line of extending their educational influence and making them of value to the many instead of to a favored few. Dr. Goode summed up the objects of museums as record, research, and education; the preservation of material, its study, and the publication of information in the shape of books, and the spread of knowledge by the display of specimens. In a broad way museums may be divided into museums of natural history and museums of anthropology, the former including all natural objects, the latter man and his works. Following Dr. Goode, they may be classified under the following heads: museums of art, natural history, history, anthropology, technology, and commerce. Or, following the same authority, museums may be classed according to their purposes as national, local, provincial, or city; college, or school; professional, or class museums, and museums of special research.

The exhibits of art museums call for a somewhat different arrangement from those noted above; for the æsthetic enjoyment of art objects is at least as important a factor as their educative value. This was formerly the guiding principle in the arrangement of art museums. The finest specimens were placed in a single room, as in the Tribuna of the Uffizi, or the Salon Carré of the Louvre. But it soon became evident that works of art are seen to best advantage with those of the same epoch and school, and this classification has been generally adopted. Furthermore, it is essential that all important examples should be on exhibition. The establishment of art museums began in Italy, where in the fourteenth century the rulers and the nobility began to make collections of

coins and gems. Busts and statues were added later, and it was not until the seventeenth century that pictures and drawings were also introduced. The oldest important collections on record are those brought together by Cosmo de' Medici (1389–1464), which, with the other Medicean treasures, form the nucleus of the present Florentine collections, particularly rich in Renaissance art. (See UFFIZI PALACE; PITTI PALACE.) The two chief museum centres of Italy, besides Florence, are Rome, with the magnificent papal collections of the Vatican (q.v.) for classical, and the Lateran for Christian, art, besides important museums belonging to the state; and Naples, whose museum is particularly rich in classical (Greek) antiquities. Almost every important Italian city has a noteworthy museum. (See VENICE; MILAN; ETC.) The principal museum of France is the Louvre (q.v.) in Paris; the provincial collections are important only for local antiquities and French painting. Among German cities, Berlin has a fine group of well-arranged museums, representing all branches of art; Dresden is particularly rich in painting; Munich in antique sculpture and painting; and Nuremberg in the decorative arts. Vienna also has a fine group of museums, of modern construction and particularly rich in painting. The principal collections in London are the British Museum, the National Gallery, and the Victoria and Albert Museum (qq.v.). The Rijks-Museum in Amsterdam is the most important in Holland; the Prado (Madrid) in Spain; and the Hermitage, Petrograd, in Russia. There are museums of some importance in all the Scandinavian capitals, and at Zurich and Basel in Switzerland. The museums of Athens are important for the study of originals of Greek sculpture, and that of Cairo is by far the richest in Egyptian antiquities. In the United States the oldest public museum is that of the Pennsylvania Academy of Fine Arts (1805), the most important is the Metropolitan Museum of Art (q.v.), in New York, and next to it the Museum of Fine Arts in Boston. Other noteworthy museums are the Art Institute, Chicago (1879), the Corcoran and National galleries, at Washington, and those of Worcester, Mass., Buffalo, Detroit, Toledo, Pittsburgh, St. Louis, and San Francisco. During recent years art museums have been established in almost every important American city. See articles on the various cities.

The museum of natural history covers a wide field and includes many branches, any one of which is capable of separate treatment. Thus there are museums of zoölogy, botany, geology, paleontology, and mineralogy, or paleontology may be included as a part of a zoölogical, geological, or anatomical museum. The natural history collections of the British Museum constitute the largest and most celebrated museum of natural history in the world, while other famous collections are those of the Jardin des Plantes, Paris, and those of Vienna, Leyden, and Berlin. The most important museums of natural history in the United States, all of which have been extended beyond the province indicated by the name, are the collections of the United States National Museum at Washington, the American Museum of Natural History in New York, and the Museum of Comparative Zoölogy at Cambridge, Mass.

Historical museums are for the preservation of objects illustrating the history of any country, place, or period, or the development of some special subject, and here they may trespass on the province of the museum of art or of technology. Historical collections form a branch of the United States National Museum, but there are many local collections. The National Museum, Munich, is an example of a general historical museum; the Cluny Museum, Paris, is devoted to a single period; the Naples Museum tells the story of Pompeii; while the Guimet Museum, Paris, illustrates the history of religious ceremonial, and the Museum of Artillery, Paris, traces the development of weapons from the rude axe of the Stone age to the modern rapid-fire gun. Anthropological museums, in the widest sense, treat of the history of man and his relations to the universe about him. This calls for illustrations of his various activities, so that an anthropological museum may comprise art and historical collections, although these are usually treated separately. The physical characteristics of man, his clothing, weapons, ceremonial objects, household furniture, methods of transportation and of shelter are the subjects most commonly illustrated. Ethnology is that branch of anthropology which deals with the characteristics, occupations, arts, and industries of the races of men as distinguished from one another. Archæology treats of the history of ancient man, and sections of a large museum or an entire museum may be devoted to the illustration of either of these subjects. The department of anthropology of the United States National Museum is very extensive, and so is that of the American Museum of Natural History, New York. The Peabody Museum of Archæology and Ethnology, Cambridge, Mass., is particularly rich in American antiquities, and so is the Archæological Museum of the University of Pennsylvania. Abroad there are important anthropological museums in Berlin, Dresden, and Munich; the Trocadéro, Paris; and the Pitt Rivers collection at Oxford, the latter being specially arranged to illustrate the development of the arts.

Technological museums deal with various phases of the industrial arts. They display specimens of the raw materials that enter into the composition of a given product, trace the various processes to which these are subjected, show the tools or machinery by which they are manipulated, and finally the finished object or substance. The subjects for technological museums are almost endless; shipbuilding, spinning and weaving, dyestuffs, drugs, foods, and electric apparatus naturally suggest themselves. The South Kensington Museum (now the Victoria and Albert), London, contains a larger technological collection than any other institution. This is now under the charge of the National Board of Education, and its influence is not confined to London, for a part of its work consists in lending carefully selected collections to local museums and technical schools in other portions of Great Britain. Certain collections, including those illustrating marine architecture and engineering formerly in the Victoria and Albert Museum, have been taken to form the Science Museum, located near by. In America, the United States National Museum and the Field Museum of Natural History, Chicago, have important technological sections, the former having much material illustrating the development of electrical apparatus, while the latter is rich in objects showing the growth of methods of trans-

portation by rail. The technological and historical collections of the United States National Museum now practically constitute a separate museum though under one control. The Army Medical Museum, Washington, while devoted to the subject of the structure of man, the effects of injuries and diseases, and their treatment, is a technological museum in so far as it traces the development of surgical appliances. Commercial museums are devoted to advancing the interests of trade. They exhibit raw materials and finished products, illustrations of methods of packing and modes of distribution, and gather and furnish information as to prices and character of goods needed in and furnished by different countries. Laboratories for the analysis of various substances and the testing of materials form part of the equipment of such an institution. The Musée de Mille, Ghent, is one of the oldest European commercial museums. The Commercial Museum, Philadelphia, is the sole institution of its kind in the United States.

The past 15 years have seen many museums, varying widely in their scope, founded in many countries; have witnessed an increasing recognition of their educational value and the establishment of more direct relations between museums and schools. These have been brought about by courses of lectures, loan of material, arrangement and labeling of exhibits, while direct provision is frequently made for children either by special museums or by setting aside certain rooms or collections.

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MUSEUM PEST. Any one of several species of insects which feed upon the prepared and mounted skins of birds, mammals, reptiles, and upon dried collections of insects and other animals preserved in museums. Perhaps the most abundant and injurious of the museum pests are the beetles of the family Dermestidæ. (See DERMESTID BEETLES; also BACON BEETLE and CARPET BEETLE.) Others of these insects are the larvæ of small moths of the tineine series. Some of the common clothes moths (q.v.) are museum pests which, possibly originally feeding upon skins, have come to feed upon fabrics made from animal substances, such as wool or hair. One of the most injurious of this group is *Tinea pellionella*, which is one of the case-making clothes moths. Other substances stored or displayed in museums are attacked by other insects: the larva of a little geometrid moth, known as *Carphoxera ptelearia*, feeds on dried plants stored in herbaria; and the allied *Acidalia herbariata*, as its name indicates, has long been known to injure herbarium specimens in Europe, but is on the whole more injurious in herbalists' shops than in museums. Some of the dermestid beetles will even injure the horns of large mammals, and the bones as well, provided they are not thoroughly poisoned. A museum room once thoroughly infested with these creatures can be most readily freed from them by fumigation with bisulphide of carbon or hydrocyanic-acid gas.

MUSGRAVE, mŭz'grāv, SAMUEL (1732–80). An English physician and classical scholar, born at Washfield, Devonshire. He was educated at Oxford and, having received a Radcliffe traveling fellowship, spent some years abroad, visiting Paris (1756) to collate manuscripts for his edition of Euripides. He was in Paris again in 1763–64. From 1766 to 1770 he practiced medicine at Exeter and Plymouth. During this period he issued a pamphlet charging that the Peace of 1763 with France had been concluded only because certain members of the English ministry had been bribed by the French government. Discredited by an investigation into this charge by the House of Commons, he lived in modest circumstances in London till his death. He is now known chiefly for his edition of all the plays of Euripides (1778) and for his *Exercitationes Euripideæ* (1762).

MUSGRAVE, WILLIAM EVERETT (1869–). An American physician, born at Farmington, Tenn. He graduated M.D. from George Washington University in 1901. In 1902 he went to Manila, Philippine Islands, where he was pathologist of the Bureau of Science until

1909, then chief of clinics at the Philippine General Hospital and at the University of the Philippines, where he was also dean and professor of medicine. In 1905–06 he was president of the Medical Society of the Philippine Islands. In the *Bulletin of the Manila Medical Society*, which he edited, various of his papers appeared.

MUSGU. See MOSGU.

MUSH, mōōsh. The capital of a sanjak in the Vilayet of Bitlis, Asiatic Turkey, on the east branch of the Euphrates, 80 miles south of Erzerum (Map: Turkey in Asia, D 2). It lies at an elevation of 4200 feet at the entrance to a mountain ravine on the south side of a fertile wheat, vine, and tobacco growing plain. The town is noted for its uncleanliness and has few good houses. It is the see of Roman Catholic and Gregorian bishops and has an American mission with Protestant schools. There is an active trade in the agricultural products of the district, and embroidered caps are manufactured. It has historical reminiscences of Xenophon and of Moses Khorene, the historian. In the vicinity at Sasun occurred a terrible massacre of Armenians by the Turks in 1894. Pop., about 27,000, one-half being Armenians.

MUSHET, ROBERT. See IRON AND STEEL, METALLURGY OF, *Bessemer Process.*

MUSHKAIA, or **MUSHKI.** See MOSCHI.

MUSH'ROOM (OF. *mouscheron, mouseron,* from OF., Fr. *mousse,* moss, connected with AS. *mēos,* OHG. *mios, mos,* Ger. *Mies,* Moos, OChurch Slav. *mŭchŭ,* Lat. *muscus,* moss). The popular name of edible fungi of the family Hymenomycetaceæ, especially species of *Agaricus* and *Morchella.* The name "toadstool" is generally applied to species which have an umbrella-shaped cap. The common idea that all such are poisonous is erroneous, because some of the most highly prized species have this habit of growth, and perhaps most of the others are not injurious. The mushroom as it is generally seen is only the fruiting body of the fungus, which arises from a more or less matted mycelium or spawn. The mycelium or vegetative part consists of numerous slender white threads running in every direction through the soil. Upon these threads small knots develop, increase in size, and finally appear as the ball-like or button-like young mushrooms, which consist of a stalk, terminated by a cap or pileus, bearing upon its underside numerous thin spore-bearing plates or gills radiating from the centre or attachment of the stalk. Near the top of the stalk is a more or less perfect ring (annulus), the remnant of the delicate veil (indusium) that covered the gills during the button stage, but ruptured as the mushroom grew.

The common mushroom (*Agaricus campestris*), one of more than 1000 species of the genus *Agaricus,* is common in fields and pastures, seldom in woodlands unless open and grassy, growing throughout the summer, but most abundant in the early autumn. It is the most commonly cultivated species, is extensively grown for market, especially near large cities, and is about the only species imported and offered for sale in American markets. This species never attains a very large size; when young the stalk and fleshy cap are white, changing to light brown when older. The stalk is solid and tapers slightly towards the base. The ring is usually conspicuous, the gills pink when young, changing to brownish purple in older specimens. Mushrooms are usually gathered for market when in the ball or button stage before the veil has been broken. They have a pleasant taste and smell and, when the flesh is bruised, turn a reddish brown. The horse mushroom (*Agaricus arvensis*), a close relative, looks very much like the common mushroom, but is much larger, and the top of the cap is more shining white. The stalk becomes a little hollow with age; the gills are white at first, changing to brownish purple when comparatively old.

The methods employed in cultivating the common mushroom do not offer any great difficulties. They may be grown out of doors or where the temperature is fairly constant, as in dry cellars or in caves, abandoned mines, and quarries. Beds are made containing at the bottom a deep layer of fresh stable manure, over which is a layer of well-rotted manure. In this the spawn is planted after the temperature of the bed has fallen to about 90° F. The commercial spawn comes in two forms, bricks and flakes, made of horse manure impregnated with the mycelium of the fungus. When planted, both kinds are broken up and distributed through the bed. The beds, which must be kept moist, but not wet, are then well covered with straw or mats to keep the surface moist. After a week or 10 days the mulch is removed and the beds covered with good loam to a depth of 2 inches. They may be again covered with the mulch, which should be removed when the mushrooms, which should be gathered daily, begin to appear. Mushroom culture is sometimes interfered with by parasitic fungi, especially by species of *Mycogone,* and serious losses have been reported in Europe and America. The parasite discolors and distorts the mushroom and may cause failure of the crop. The removal of all diseased mushrooms and the fumigation of houses and caves with formaldehyde gas are recommended as preventive measures.

In addition to the species of *Agaricus* described above, there are a great many other edible species of mushrooms belonging to other genera. Among them are the horsetail or maned agaric (*Coprinus comatus*), the ink caps (*Coprinus atramentarius*), and the glistening comatus (*Coprinus micaceus*). These have black spores; the cap does not expand, but remains more like a partly closed umbrella. When old, these species become very watery and dissolve, forming a black, inky fluid. For eating they should be taken only while young. The parasol fungus (*Lepiota procera*) is a white-spored edible mushroom rather abundant in grassy places. It is rather tall on a slender stem. The cap is whitish or light brown and covered with coarse scales. The ring is free and not fastened to the stalk. Another highly prized species is the chanterelle (*Cantharellus cibarius*), an egg-yellow species common in moist woods. The cap has an irregular, crumpled margin, is more or less depressed on the upper surface, and has shallow, blunt gills prolonged down the stalk. The fairy-ring fungus (*Marasmius oreades*), common in lawns and meadows, is also edible. There are some species having the same habit of growing in circles that are reputed poisonous. The edible ones are white-spored, have hollow stalks, and are seldom more than 2 inches across the pale-yellow or drab cap, which is often concave on top and raised in the centre. One class of gill-bearing fungi exude, when broken, a milky juice. The species of this kind belong to the genus *Lactarius.* Some have a very acrid juice, but one (*Lactarius deliciosus*) is considered very choice by mushroom lovers. It grows

in damp woods in mountainous regions, but is not common in lowlands. It cannot be mistaken for any injurious species, as the milk exuded by it is always red with a tinge of orange and slowly changes color to greenish. The fungus is a little lighter in color than the milk exuded by it.

Boletus is another of the common genera. The species are rather difficult of identification and should not be eaten by a novice. Some of the Gasteromycetes, e.g., the puffballs (*Lycoperdon giganteum* and *Lycoperdon cyathiforme*), are common edible species. The former attains a diameter of 10 inches or more and has a smooth, white, kidlike surface when young, with a firm white or pale-yellow flesh. The other is 6 inches in diameter, flattened and tessellated on top, and contracted at the base. In color it varies from white to brown. The puffballs should be taken while young and before the spores are developed. One species (*Scleroderma vulgare*), related to the ones just described and suspected of being injurious, may be recognized by its tough, hard, yellowish-brown, warty exterior and purplish-black interior mottled with white. Among the most highly prized of edible fungi are the morels and truffles (*Tuber melanosporum*).

Since several species of mushrooms have not yet been proved harmless and since occasional cases of poisoning are still attributed to their use as food, the following rules, formulated by Farlow, are given as guides for the inexperienced collector: "Avoid fungi when in the button or unexpanded stage; also those in which the flesh has begun to decay even if only slightly. Avoid all fungi which have stalks with a swollen base surrounded by a sac-like or scaly envelope, especially if the gills are white. Avoid fungi having a milky juice, unless the milk is reddish." These rules are not absolute, because there are exceptions to them, but are safe for the novice to follow. See FUNGI, EDIBLE AND POISONOUS.

Mushrooms as Food. Since mushrooms and other edible fungi are often said to be nutritious food, to contain large quantities of protein, and to rank close to meat as sources of nitrogenous material, extravagant statements have been made concerning them. When fresh, mushrooms have the following percentage composition: water, 88.1; protein, 3.5; fat, 0.4; nitrogen-free extract, 6; crude fibre, 0.8; ash, 1.2. Other edible fungi closely resemble them so far as analyses have been reported. Like all green vegetables mushrooms have a high water content in proportion to their bulk, and, as regards protein content, they rank about the same as potatoes, to which they are decidedly inferior in food value, since they contain much less carbohydrates, and the nitrogen present is largely in the form of non-albuminoids, which are thought to have little food value. The numerous studies which have been made show that mushrooms are not thoroughly digested. Recent experiments show that 25 to 59 per cent is indigestible. See FUNGI, EDIBLE AND POISONOUS.

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MUSHROOM GNAT. The name given by mushroom growers to any of the fungus gnats of the family Mycetophilidæ. (See GNAT.) These are small, mosquito-like creatures with feathered antennæ and frequent, as a rule, vegetable matter or fungi, upon which their larvæ feed. The larvæ are slender, white, wormlike creatures, with a distinct black head. The larva of one species of the genus *Sciara* is especially injurious to mushrooms, which it eats into and ruins. In mushroom cellars, fumigation with tobacco or pyrethrum will kill the flies.

MUSHROOM POISONING. A severe and frequently fatal form of poisoning from eating noxious varieties of mushrooms or other fungi, the most common being the fly fungus, or *Amanita muscaria* (see AMANITA), the active principle of which is muscarine. Individuals who have eaten a poisonous fungus are seized within a short time thereafter with severe abdominal pains and rapidly become cyanosed; collapse and muscular spasms set in, soon followed by death, unless prompt treatment is instituted. The treatment is to wash out the stomach with a stomach pump, empty the intestines by means of a purge, and administer stimulants. The physiological antidote for muscarine is atropine; this or tincture of belladonna should be given as soon as the stomach and bowels are emptied. See FUNGI; MUSHROOM.

MUSIC (OF., Fr. *musique*, from Lat. *musica*, from Gk. *μουσική*, *mousikē*, music, from *μουσικός*, *mousikos*, relating to the Muses, from *Μοῦσα*, *Mousa*, Muse). Music is a mode of motion. It is a modification by art of aërial vibrations, whose impact upon the auditory nerve makes mental varying images. Sound, the raw material from which music is fashioned, is produced by motion.

Matter is the stimulus; sensation is the result. "The kind of motion, however, that goes to produce sound is not that of matter precisely, but rather of the molecules or ultimate particles of which matter is composed. When the state of equilibrium of an elastic body is disturbed by a shock or by friction, it tends to regain its condition of equilibrium, but does so only after a greater or less number of vibrations, or oscillating movements, of the molecules of which the mass of the body is composed." Thus J. A.

Zahm, a profound investigator in acoustics and a follower of the great Helmholtz, whose masterly tonal researches are set forth in his *Die Lehre von den Tonempfindungen*. The nature of sound, Lord Bacon observes, "in general hath been superficially observed. It is one of the subtilest pieces of Nature." The nineteenth century has endeavored to wipe away Bacon's reproach, for the studies and experimentings of such men as Helmholtz, Rudolf König, Blaserna, Tyndall, Stumpf, and others have lifted into light the darkest problems of acoustics. The latest researches teach us that sound vibrations—vibrations audible to the ear—have a rapidity which ranges from 16 to 36,500 per second. Heat vibrations begin at 134 trillions per second; light vibrations, visible to the eye, at 483 trillions. The gamut of the rainbow has its velocity measurements. Chemical vibrations, "shown only by certain reactions in prepared photographic plates," are beyond our sense perceptions. Sonorous vibrations, then, are really the slowest of all. Dr. William Ramsay asserts, in his *Essay on Smell*, that the sense of smell is excited by vibrations of a lower period than light and heat. Sounds of a musical character rarely extend beyond a minimum of 16 and a maximum of 4138 vibrations, respectively the rates of vibration of the lowest tone of an organ with a pipe of 32 feet and the top note of a piccolo. The production of sound, its transmission, and its aural perception may all be demonstrated with a long piece of stretched string. In its position of equilibrium it represents a straight line; pluck it and its elasticity will cause it to return. This is a simple vibration. But the string also goes in the opposite direction, and this is a double vibration. Like a pendulum the vibrations of the string are isochronous, each occupying exactly the same length of time. By shortening the string or increasing its tension we get vibrations of various velocities, and the ear perceives various pitches from 16 vibrations to the second up to 4224 vibrations. Increase the tension beyond this point and shrillness results; below 16 a dull unmusical whirring. The same results acoustically may be produced with pipes of varying lengths. The vibrations are, as in the case with strings, isochronous; they vary in rapidity according to the length of the pipe; subdivide them and harmonics are produced. Nodes and vibrating segments are the crude material of music; pitch, loudness, and timbre or quality determine the tone. All these qualities depend upon the rapidity of the vibrations. It is demonstrated that the number of vibrations of strings is inversely proportional to their length; that the number of vibrations of strings is in inverse ratio to their diameter; that, experimenting with two wires at tension, but of differing density, we get the rule that the number of vibrations of a string is inversely proportional to the square root of their density; finally, as Helmholtz shows by varying the stretching weight, that the number of vibrations of strings is directly proportional to the square root of their stretching weights. Thus, the longer, thicker, heavier a string is, the slower are its vibrations and the deeper is its tone. The shorter, finer, lighter, tenser it is, the more rapid are its vibrations and the higher is its tone. Now the sound produced by a string vibrating its entire length is its fundamental or natural tone. It can produce many other sounds at the same time, subdividing them as it vibrates; these are the overtones or harmonics, partial and concomitant sounds. The series of harmonics theoretically may be divided infinitely, but for musical purposes they are numbered in accordance with the number of vibrating segments or loops. The nodes exceed by one in number the loops, taking the ends of the tense string as nodes. The fundamental vibrating with one loop is the first harmonic of the tone, and the harmonics on the numerical order are constantly nearer and nearer together, the successive intervals being an octave, fifth, fourth, third, second. We are at the very beginnings of the scale. The clay is ready for the musical sculptor. Mersenne's law is that the loudness of sound varies inversely as the square of the distance of the sonorous body from the ear. So the range of audition is over 11 octaves, but this is for an exceptional ear.

Musical sounds differ from each other in loudness, in pitch, and in quality. Biot says that "all sonorous bodies yield simultaneously an infinite number of sounds of gradually increasing intensity." This phenomenon is similar to that which obtains for the harmonics of strings, but the law for the series of harmonics is different for bodies of various forms. May it not be this difference which produces the particular character of sound, called timbre (*Klangfarbe*, clang tint), which distinguishes each form of body and causes the sound of a string and that of a vase to produce in us different sensations? May it not be owing to the diminution of the intensity in harmonics of each series that we find agreeable certain concords that would be intolerable if produced by sounds equally loud? And may not the quality of each particular substance—of wood or metal, e.g.—be due to the superior intensity of one or another harmonic?

We have now some dim idea of the natural laws which give us force or loudness, pitch, and quality in music. The whole subject in all its fascinating range and variety is admirably treated in Zahm's *Sound and Music*. Therein may be learned much about the production and transmission of sound, its velocity, reflection, refraction, resonance, and interference. Of pitch it may only be said here that its standard in music is the A string of the violin, which gives the tuning note for orchestras. It corresponds to *a'* above middle C of the pianoforte. *a'* as a vibration number of 435 was chosen in 1859 as a standard pitch. This is called the French pitch, and its exact vibrations are really 435.45. It is the standard pitch of our orchestras and since 1892 for all pianofortes. (See PITCH.) All the modifications of sound made by the ingenuity of man in his inventions of string, wood, brass, pipe—as in the organ—and percussion instruments, from the drum to the piano, give us variety in tonal timbre and are based on the human voice, which with its bass, tenor, alto, and soprano served as a model for the viol family.

Helmholtz has considered the analogies of light and sound, both being modes of vibratory motion. In his psychological optics he gives the following analogies between the notes of the piano and the colors of the spectrum:

F♯	End of the red	d♯	Cyanogen blue
g	Red	E	Indigo blue
g♯	Red	f	Violet
A	Red	f♯	Violet
A♯	Orange-red	g	Ultra-violet
B	Orange	g♯	Ultra-violet
C	Yellow	a	Ultra-violet
C♯	Green	a♯	Ultra-violet
d	Greenish blue	b	End of the solar spectrum

Upon this laboratory experiment some imaginative theorists have endeavored to rear a system of musical æsthetics, but unsuccessfully, though we have come to speak naturally of color in music. Tone and color, while related, as are all things mundane, are far asunder in terms of art; in fact, when used in their proper meaning, they constitute the foundation of two widely different arts—music and painting. Whenever the musician speaks of "color," he employs the word only with a figurative meaning, as synonymous with "timbre," "clang tint." Especially the modern school of piano playing is concerned with "tonal color," a term denoting those infinite and subtle varieties of tone produced by the different touches.

In March, 1915, the Russian Symphony Orchestra produced in New York a symphonic poem, *Prometheus*, by Scriabine (q.v.), in which the composer actually carried out Helmholtz's theory. As each chord was played its corresponding color was projected on a screen. The verdict of all musicians was unanimous—that no relation could be perceived between sound and color.

As the receptive organ of tone and its transmitter to the brain, the ear plays as important a part as tone itself. Without it there would be no music, paradoxical as it may sound, for it is the eye that perceives, the ear that hears, the hand that feels, which give us our picture of the world. Under this hypothesis the world, then, is idea, idealists and materialists meeting amicably on the little strip of territory called sensation. The complete apparatus of the ear, the wonderful "lute of three thousand strings," called the cortical fibres after their discoverer Corti, should be carefully investigated by the student. We may now truthfully affirm, after briefly studying the production of sound and its modifications by instruments, that music is a mode of motion.

But music as a pleasure-evoking emotion! Whence comes it, what is its psychologic basis? It is purely human, for not the most fanciful of poets or extravagant of psychologists can torture into formal beauty the songs of birds, the growling of the tempest, the sound of the sea. All these things and many more may furnish the starting point, the springboard of the composer's imaginings, but artistic they are not. There is no real music in nature. As a play impulse, art has been considered and discussed by many modern writers. Schopenhauer, whose intuitions are often superior to other men's logic, calls art "a momentary liberation," and Herbert Spencer develops his idea, linking it with biological conditions. In his *Principles of Psychology* he says that a characteristic of nerve processes is that the superfluous integration of ganglion cells should be accompanied by an inherited readiness to discharge. Thus the "aimless activity" we call play is the result of a force expended, a force that man as a highly developed animal has more of than is needed for the struggle of existence. In many animals he finds imitation a factor, but Karl Groos in his *Play of Man* believes in impulse and intuition—"the inherited impulse towards prescribed reactions in certain brain tracts seems to be in itself a sufficient cause for play without the necessary accompaniment of superfluous energy." Schiller calls play a harmless expenditure of exuberant strength which is its own excuse for action. Lazarus is the exponent of the reaction theory. When we are tired of natural or physical labor, we play, thus recreating ourselves. Professor Groos, however, finds in both the surplus expenditure and the recreation theories only partial statements of the truth. For him play is the impulse towards repetition, and this is a physiological reason for playing to the exhaustion point, which we notice so often, even if we are tired at the beginning. "Let us recall first," he writes, "the tremendous significance of involuntary repetition to all animal life, for just as the simplest organisms in alternate expansion and contraction and the higher ones in heartbeats and breathing are pervaded by waves of movements, so also in the sphere of voluntary activity there is a well-nigh irresistible tendency to repletion." Play, too, furnishes distraction from quotidian cares. It is an educational factor of prime importance, elaborating immature capacities and influencing the evolution of hereditary qualities. Schiller declares that man alternates between weak and sensuous pleasures, and his dictum that man is fully human only when playing has, as Professor Groos declares, "definite biological meaning." Conrad Lange defines art "as the capacity possessed by men of furnishing themselves and others with pleasure based on conscious self-illusion, which by widening and deepening human perception and emotion tends to preserve and improve the race." This is but an amplification of Schiller's remark. And art is but the play impulse immeasurably elevated, yet at its roots possessing a sham objective character. The earliest form of musical art, the pantomimic dance, was "an expression of muscular force simulating the acts of life." It was symbolical, it expressed a feeling, a state of mind. In its genesis art was play of a semiphysiological character. Primitive dancing comprised music and poetry in solution; later on they became separate and independent arts. Rhythm, the father of organized music, played a big rôle, for rhythm is cosmic, it is manifested in the heartbeat—the unit of measure for all the temporal arts—the tides and the movements of the bodies in the interstellar depths. Dancing accompanied by rudimentary songs—perhaps of only two or three tones—is the first step of the musical art. Emotions were translated in the rough, yet effectively; the pantomime of the savages is always clear, attempting as it does the expression of love, anger, terror, hatred, and happiness. How much the sexual attributes play in the beginnings of art we cannot say, but music in the light of modern researches may no longer be called the Heavenly Maid. Far from it indeed, for, as Havelock Ellis truthfully says: "In music the most indefinite and profound mysteries are revealed and placed outside us as a gracious, marvelous globe; the very secret of the soul is brought forth and set in the audible world. That is why no other art smites us with so powerfully religious an appeal as music; no other art tells us such old forgotten secrets about ourselves. It is in the mightiest of all instincts, the primitive sexual traditions of the races before civilized man, that music is rooted. . . . The sexual instinct is more poignant and overmastering, more ancient than any as a source of beauty. . . . Beauty is the child of love." Music is an emotion become æsthetic. Human beings, as Ribot says, began by thinking that beautiful which resembled themselves. Primitive art was addressed to the individual of our own species. As it became more disinterested it exhibited re-

ligious qualities and eventually was transformed into a ritual, a ceremony for the expression of awe or thankfulness to the deity. It had a specific character and one that had but remote affiliations with our modern conceptions of art. The natural extrusion of sympathy, the conquest of nature by the intellect, has given us two of the most modern arts—music and landscape painting. Neither of these had any real existence in the Old World civilizations; indeed, a feeling for nature in poetry and painting may be said to date from yesterday. The patient flowering of savage, rhythmic cries into the score of a Beethoven symphony is only comparable—to mention purely human processes—to the evolution from a South Sea Islander's simple mud hut to the magnificent complexities of a Gothic cathedral. From the sheltering needs of the body comes the noble art of architecture; from the social needs of intercourse, self-expression, come poetry and music. Both were the irrepressible and the irresponsible exhibition of surplus energy, of the play impulse. And on this side is music purely sensuous.

Kant defines the beautiful as that which "through the harmony of its form with the faculty of human knowledge awakens a disinterested, universal, and necessary satisfaction." We are now another remove from the utilitarian, for in a certain sense all art is useless, inasmuch as it bestows no material benefits. Its beauty is its excuse for being, and music, being the least representative of the arts, copying no material forms, is therefore easily the most ideal of all the arts and the most inutile. Apprehended in time and not in space, it addresses itself to the imagination. And here we are confronted by the crux of Hanslick and other æstheticians of the formal. "Definite feelings and emotions are unsusceptible of being embodied in music," he declares. Music does not express emotion, it expresses itself. It is sound play; it consists of exquisite arabesques; it is a formal pattern of tone, and all the wonderful things attributed to it exist only in the overheated imagination of its hearers. Precisely so, and it is this almost miraculous subjectivizing process that proves the weakness of Hanslick's thesis. No other art attacks so powerfully the emotions. "Music acts like a burn, like cold, heat, or a caressing contact. Music acts on the muscular system, on the circulation, the respiration . . . and is the most dependent on physiological conditions. The primary effect is a physical one." Beauquier says: "Musical vibration is only one particular mode of perceiving the universal vibration. . . . Musical art is the art of sensibility par excellence, since it regulates the great phenomena of vibration into which all external perceptions resolve themselves and transfers it from the region of the unconscious, in which it was hidden, to that of consciousness." Again Ribot: "While certain arts at once awaken ideas which give a determination to the feelings, music acts inversely. It creates dispositions depending on the organic state and on nervous activity, which we translate by the vague terms joy, tenderness, serenity, tranquillity, uneasiness. On this canvas the intellect embroiders its designs at pleasure, varying according to individual peculiarities." Let us admit, then, with Hanslick and the formalists, that music does not *express* emotion; yet this does not preclude the idea of an emotional content in the listener, who projects his personality into the forms. In music the forms and the subject are identical; we cannot dissociate the pattern of the love theme in *Tristan und Isolde* from its emotional effect. The sound once set in motion, we are at liberty to dream, to thrill, to weep, to sigh with all the moods superinduced by a master. And this playing upon our nerves, our imagination, is intentional. In modern times music has become an instrument of overpowering emotional significance. Eighteenth-century music, with its gay scheme of decoration, its pretty recurring patterns, its play of forms, and its freedom from the overwrought, the intense, can well be utilized by Hanslick as an example of music for music's sake. It expressed little in the latter-day connotation of the word; so to modern music, especially Beethoven, we might truthfully give the title of classic, as it fulfills many of the requisites of antique art—its dignity, symmetry, grandeur, and profound emotional quality. The position of the formalist school is based on a half truth. A study of the nature of emotions would have cleared the ground long ago of encumbering verbalisms. Ribot defines the technique of an emotion thus: "First an intellectual state, then organic and motor disturbances, and then the consciousness of these disturbances, which is the psychic state we call emotion." This clear definition of a very complicated process may be applied to the effects of music upon a sympathetic listener—naturally sympathy must be granted, else all music addresses itself to the deaf. A vast mirror of subjectivity, music appeals to each of us according to our temperaments. It paints upon the background of our consciousness enlarged meanings of ourselves. Composed of alternate sound and silence, it reaches our very soul with its rhythmic pulsings and sensuous qualities. It is at once the most impersonal and most personal of all the arts. It traverses the keyboard of our desires and arouses noble ambitions or sensual crises as well. It is an unmoral art; it can be impressed with equal facility in the service of church or tavern. Its very plasticity makes it an agent for evil and nevertheless a powerful aid to worship. It is because of this easily molded nature that music has served in every camp, has gone to the wars, has sounded the psalms of peace, has been the bone of contention between warring schools and factions, has led the bride to the altar, and intoned the grief for one lying dead. Music, in some form or other, has always accompanied man on his march through the ages, tracing in spiritual mimicry his evanescent emotional gestures. Captive to his baser senses, a column of smoke by day, this agile protean art has played the pillar of flame, a burning eloquent sign in the darkened skies of revolt, superstition, and misery. A potent symbol, "a mighty fortress" during the Middle Ages, music served the Church faithfully, and when enfranchised it has as faithfully recorded the great emotions of secular souls. Ariel and Caliban—to what purposes has this versatile art not been put? At first man played upon a reed to his mate; then he grew in love with his tune for its own sake. To-day, after putting the art through all its probable paces, it has been harnessed to the Drama, and, from being the exponent of pure, formal beauty, it is pressed into the service of the Characteristic. The Chinese, thousands of years ago, discovered the charm of ugliness, and it would seem that modern music is striving for that goal. Rosenkranz has written a volume on

Æsthetics of the Ugly, and in the general hurly-burly, topsy-turvying of the arts it would not be improbable if music played the part of devil's advocate in the new æsthetic dispensation. The line of demarcation between the beautiful and the ugly is slight, for beauty is a relative quality, and ugliness often proves its capital foil. To show how shifting has been the standard of musical beauty one has only to consult history or personal memories. A decade may transform the musical map, deposing reigning monarchs and elevating to the purple the veriest newcomer. Music is a fickle goddess.

How far symbolism may be pushed in music is seen in the attempts to pin down the phrase to precise meanings. It is true that there is a key symbolism, that not by chance have the great composers selected certain keys—keys that, in Wordsworth's happy expression, are inevitable. Beethoven's Fifth Symphony is inconceivable in C sharp minor or E flat minor. C minor is a portion of its life. Berlioz has compiled a table of key characteristics, and a certain theorist does not hesitate to call F major rugged; B major, energetic; E major, radiant, warm, joyous; A major, frank, sonorous; D major, gay, brilliant, alert; and so on through the list. Here again temperament counts, all else is purely arbitrary. Music has the power of evoking moods, that is a common experience; and it has on the formal side analogies to architecture, for it is structural, it is architectonic, and its subject is imitative of no known model. This has led Walter Pater to asseverate that all the arts in common aspire "towards music, music being the typical or ideally consummate art, the object of the great *Anders-Streben*—reaching forward—of all art, of all that is artistic or partakes of artistic qualities." It is "the blending of the animative thought and embodying vehicle," the absorption of the matter into the form of which music is the one perfect example among the arts, that attracted Pater. "All art constantly aspires towards the condition of music," he wrote, and made of sensual presentation, emotional suggestion, and technical perfection the archetype for all the arts. The danger of this view lies in the slighting of music's tremendous evocation of our subliminal depths, of spiritual shades. These cannot be exorcised by technical loveliness or richness of emotional eloquence. Beethoven has taught us in his symphonies that from tone may be wrung almost an ethical meaning. The Platonic theory of an ideal type for all the arts could not have failed to impress Pater. But it stops at the outer porches of the ear, the tone which should penetrate to the inner sanctuary losing on the way some of its grosser connotations. His doctrine is that art is always striving to be independent of mere intelligence, that the vaguer the subject the greater the impact of the thrill upon our souls. Gustave Flaubert, who is the creator of both the realistic and the symbolistic school, had some such idea; for he wished his prose to be as independent as music, to float in mid-air by reason of its euphony and rhythm. And there can be no doubt that it is the perfect balance found in Beethoven's phrases, both the meaning and the music, that makes of them the greater type for all future symphonists. Poetry is the usual standard for painter, poet, sculptor, and composer, and, as John Addington Symonds shows, this is as much of a heresy as Pater's. F. W. H. Myers writes: "The range of human thoughts and emotions greatly transcends the range of such symbols as man has invented to express them, and it becomes, therefore, the business of art to use these symbols in a double way. They must be used for the direct representation of thought and feeling, but they must also be combined by so subtle an imagination as to suggest much which there is no means of directly expressing. This power gives birth to the art of the musician, whose symbols are hardly imitative at all, but express emotions which, till music suggests them, have been not only unknown, but unimaginable." To each art its particular province. There is music in Milton; Wagner is a great painter; Bach an architect; and through the marmoreal prose of Flaubert rings the sound of the sculptor's chisel. But this "reaching forward" is, as Symonds says, "at its best a way of expressing our sense of something subjective in the styles of artists or of epochs, not of something in the arts themselves." The subjectivity of a critic prompts him to select a particular art as the type for all. Wagner, in a superb effort, attempted to house all the arts within the walls of a mighty synthesis. Music, however, won the victory; it is Wagner the composer who will live, not Wagner the dramatic poet or Wagner the scene painter. The intellectualists are quite as wrong in their endeavor to force upon music the office of preacher or philosopher. By reason of its limitations music is not well adapted for the expression of an intellectual content. It gives us the maximum of sensuous effect, though we do not agree with Symonds that in it is the minimum appeal to the intelligence. If this were so, Bach, Beethoven, Chopin, Brahms, Wagner, Richard Strauss would not be in the same category with Dante, Michelangelo, Milton, Shakespeare, Shelley, Swinburne, and Rodin. Besides, has not Spencer said, "The emotions are the masters, the intellect is the servant"? Great intellectuality, great emotional temperaments go to the making of great composers as well as of great architects, poets, dramatists, painters, and sculptors. Architecture is not emotional like music, but it is more concrete, it arouses the sense of the sublime—which music does, too, under certain conditions. Sculpture is impressive in its symbolism of the human form and its evocation of harmonious lines; of all the arts it is the most unlike music. Painting, with its illusions of life on a flat superficies, has certain affinities with music, while music and poetry have several qualities in common—the subtleties of sound and the power of continuous narration—though here music speaks a tongue not to be translated into words. It gives the sense of situation, not action, the prism of the arts, as Symonds phrases it, "each distinct, but homogeneous, and tinctured at their edges with hues borrowed from the sister arts. Their differences derive from the several vehicles they are bound to employ. Their unity is the spiritual substance which they express in common. Abstract beauty is one and indivisible. But the concrete shapes which manifest this beauty decompose it, just as the prism analyzes white light into colors."

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MUSIC, CONSERVATORY OF. A school for instruction in music. See CONSERVATORY.

MUSIC, HISTORY OF. The beginning of music goes back to the beginning of the human race. Investigations, especially in recent decades, among widely different savage nations have established the fact that all primitive music rests upon the pentatonic scale. It is not merely a coincidence, therefore, that the oldest musical systems of the civilized nations of antiquity likewise are built upon this pentatonic scale of five whole tones, which became heptatonic through the addition of two semitones only when a nation had reached a certain degree of culture. For primitive musical systems, see the special articles on ARABIAN, CELTIC, CHINESE, EGYPTIAN, FINNISH, FOLK, GREEK, HEBREW, HINDU, INDIAN, JAPANESE, MAGYAR, SCOTCH, SLAVONIC MUSIC; MODES; PLAIN CHANT.

It is impossible to tell with certainty when and by whom a second voice, moving in another interval than the octave, was first introduced. Hucbald (q.v.), the foremost theoretical writer of the tenth century, describes the beginning of harmony as the simultaneous progression of two parts in parallel fifths, known as *organum*. In the next century Guido of Arezzo (q.v.) substituted fourths for the fifths, and this innovation soon led to the employment of the remaining intervals. When after several thousand years music had progressed so far, it had at last found its true material, which is not the single tone and its melodic progression, but the chord and its harmonic progression.

I. *Old French School* (c.1100–1350).—The principal merits of this school are the invention of the *faux-bourdon* (a progression of voices in sixths and thirds) and the *discant* (contrary motion of voices). This contrary motion led to counterpoint, and this again to the establishment of a system of notation in which the different values of the notes in regard to time were definitely fixed. (See MENSURABLE MUSIC.) After a *discant* was once set in contrary motion to a *cantus firmus* composers soon conceived the idea of adding a third and even a fourth voice. But the masters of the Old French school did not stop here; they succeeded also in imparting complete independence to the individual voices. Three art forms were developed —the *motet*, *rondellus* (rondeau), and *conductus* (conduit). In all these forms are found well-defined passages of writing which to-day we call canon and imitation. The prominent masters are Leonin, Perotin, De Garlande, Franko of Paris, De Vitry, De Machault, De Muris.

II. *Gallo-Belgic School* (c.1350–1500).—The masters of this school began to feel the emptiness of consecutive fourths and fifths, and so used sixths and thirds more freely. Greater attention was given to the leading of the voices, and technique made great strides. Occasionally the compositions rise above the level of mere technicality. The principal masters are De Zeelandia, Faugues, Dufay, Binchois, Busnois, Regis.

III. *School of the Netherlands* (c.1450–1600). —This school divides itself into four distinct periods: 1. Okeghem developed the art of canonic writing to such an extent that it became merely ingenious trickery. Instead of unified forms, the works of this school present a conglomeration of detached details. Okeghem's successors were Hobrecht, Tinctor, Jannequin, Brumel, Compère. 2. The leader of the second period is Josquin Deprès, a pupil of Okeghem. He and his contemporaries strove to make their skill subservient to artistic purposes by emphasizing the symmetry of form and by paying attention to the development of their themes. The leading composers are, besides Deprès, Agricola and Mouton. 3. The extreme artificiality of the two preceding periods led to a reaction in favor of a more simple and natural style. The masters started from Josquin's principle of symmetry. They also developed the purity of harmonic writing and insisted upon definite melodic phrases. Several of them carried this style to Italy, where they became the founders of new schools. These composers were Gombert, Willaert, Goudimel, Arcadelt, Van Rore. 4. The fourth period shows the influences which the Italian schools had begun to exert over the mother school. Whereas the importance of earlier schools rests entirely upon the vocal works, the fourth period marks the rise of instrumental music (organ) in the works of Sweelinck, who practically became the founder of the famous school of the North German organists. The whole school of the Netherlands reached its culmination in the works of Orlando di Lasso, a master scarcely inferior to the great Palestrina. The great musicians of this period are Sweelinck, Lasso, Di Monte, Pevernage.

IV. *Old English School* (c.1220–1600).—1. England possesses the oldest-known specimen of polyphonic writing, the famous canon "Sumer is icumen in." As long as the school of the Netherlands was regarded as the oldest, this manuscript puzzled musical historians. Coussemaker in 1865 proved the existence of the still older French school (I), and so this canon is now assigned to the year 1226. During the fifteenth century a school showing the same general characteristics as the Old French school must have existed in England, if we may judge from a few preserved compositions by John of Dunstable, Power, and Benet. 2. The reign of Henry VIII witnessed a considerable musical activity, but no new style was created. The representative composers, Redford, Johnson, Merbecke, and Tye, show the influence of the school of the Netherlands. 3. These men really prepared the way for the next generation, when the style of the school of Venice predominated. Of this period numerous large choral works and madrigals have been preserved. The chief composers are Farrant, Tallis, Byrd, Gibbons.

V. *School of Venice* (1527–1612).—Willaert

brought the musical art of the Netherlands to Venice, where he settled in 1527. Under the influence of the more impressionable Italian musicians he gradually acquired a new style. In the style of the Netherlands each voice was practically independent, and its relation to a definite chord was not strongly pronounced. The Venetian masters established the chord as their basis, and, instead of simultaneous progressions of voices, we find, rather, progressions of chords. The independence of the separate voices was restricted, but not abolished. The custom of writing for a double chorus was introduced, the madrigal was perfected, and for the first time vocal works with instrumental accompaniment appear. The great composers of this school are Willaert, A. Gabrieli, Van Rore, Zarlino, Merulo, Donati, G. Gabrieli.

VI. *School of Rome* (1535–1674).—Italy owes it to this school that she once was regarded as the most musical nation. While the Venetian school regarded the chord as a basis, and gained their effects largely by means of modulation, the Roman masters restored greater freedom to the individual voices and subordinated technique to art. The introduction of secular themes into sacred works had led to serious abuses, but the Roman masters, especially Palestrina, proved that the contrapuntal style is not antagonistic to the dignity proper to Church music. To the Roman school also belongs the honor of having originated the oratorio (Carissimi) and a distinct instrumental style (Frescobaldi). Merulo in Venice had done much to develop the toccata, but not until Frescobaldi appeared did instrumental music become entirely free from the influence of vocal music. The greatest masters are Ferrabosco, Festa, Animuccia, Palestrina, Nanini, Anerio, Allegri, Frescobaldi, Carissimi.

VII. *Spanish School* (1540–1608).—Spain at no time succeeded in establishing an original school. During the sixteenth century several Spanish composers lived in Rome, and returning to their native land, carried with them the art of the Roman school, so that in reality the Spanish school forms only a part of the Roman school. The most prominent Spanish masters are Da Vittoria and Morales. The Portuguese composer à Goes shows the influence of Gombert, which can be accounted for by the fact that this Flemish musician spent some years in Spain.

VIII. *German Polyphonic School* (1500–1625).—This school divides itself into two periods, the former showing Flemish, the latter Venetian, influences, but in the frequent and bold use of dissonances the German masters go beyond their predecessors. The chief composers showing Flemish influences are Isaak, Heinrich Finck, Senffl, Hermann Finck. Those showing Italian influences (almost all pupils of G. Gabrieli) are Gallus, Gumpeltzhaimer, Hasler, Aichinger, Prätorius.

IX. *School of Protestant Church Music* (1540–1672).—1. In Germany, the Reformation popularized Church music by the introduction of congregational singing. For untrained voices simple music was needed, and this need gave rise to the *chorale*, which originated in the singing of sacred words to popular folk songs. The musicians whose importance rests chiefly upon their chorales are Luther, Walther, Eccard, Calvisius, Franck, Schein. 2. From the earliest times it had been customary in the Catholic church to recite during Holy Week the Passion of Our Lord according to the Gospels. Luther desired to preserve this custom for the Reformed church. He translated the text and had various composers furnish the music. Thus arose the *passion*, to the cultivation of which many German masters devoted their best energies. Along this line vocal polyphonic music steadily developed until, in the works of Schütz, German music reached an originality that places it on a level with the famous Italian schools. The German school combines the beauty of the Roman school with the massiveness of the Venetian. In addition, there are a tenderness and a subjective, passionate element quite distinct from the colorless solemnity of the early Italian music. The important masters are Schütz, J. C. Bach, J. M. Bach.

X. *School of German Organists* (1620–1722).—1. While vocal music was steadily advancing, instrumental music, although of later date, was not neglected. Sweelinck had founded a great school in the Netherlands, which trained many Germans, who carried the art into their native land. There the cities of Hamburg and Lübeck became the centres of a new instrumental school whose basis was the chorale. The principal forms cultivated were the *toccata, ciaconna, fugue,* and, towards the end of the period, the *sonata.* The great North German masters were Scheidt, Scheidemann, Reinken, Buxtehude, Kuhnau. 2. While the North German masters developed the style of Sweelinck, a group of composers in the middle and south of Germany worked along similar lines, but under the influences of Frescobaldi and the Roman school. The authority of the Italian sonata writers had by this time extended to Germany, and the forms of the *sonata da chiesa* and the *sonata da camera* were cultivated. Nor was the fugue neglected. All the great composers used the Italian forms, but infused their own individuality into them, and thus prepared the way for J. S. Bach, who wrested the leadership in musical affairs from Italy and transferred it to Germany. The German masters who aided in this great work are Kerl, Froberger, Pachelbel, Muffat, Biber.

XI. *School of Florence* (1594–1676).—While the earlier Italian composers cultivated almost exclusively the polyphonic style of vocal music, a school with widely different tendencies sprang up in Florence. The revival of the learning of Greece led to an attempt to reconstruct the ancient drama. Thus arose the monodic style, in which one voice sings while instruments furnish the accompaniment. In 1594 Peri set an entire drama, *Dafne,* to music in this manner. Crude as the attempt was, it found favor, and in less than half a century the new style had conquered all Europe. Its development was not confined to Florence; in fact, its greatest exponent, Monteverde, was a native of Cremona, although he lived chiefly in Mantua and Venice. But, as the style originated in Florence, it seems advisable to classify all composers identified with its development under the Florentine school. This school first dispensed with the preparation of dissonances, and greatly developed the orchestra, establishing the strings as its foundation. The works of this school were first designated by the title *dramma per musica.* About 1650 we find *opera per musica,* which soon afterward became simply *opera.* The principal names of this division are Peri, Caccini, Monteverde, Cavalli. See OPERA.

XII. *School of Naples* (1675–1757).—As

early as 1475 a Flemish master, Tinctor, settled in Naples, but not until 200 years later did a distinct school arise. From Rome and Venice the Neapolitans adopted the polyphonic Church style, from Rome the oratorio, and from Florence the musical drama. The new school paid more attention to the melodic outline of the highest voice, perfected the form of the *aria* (q.v.), and introduced it into their dramatic works. Whereas the Florentine musical drama consisted of continuous recitative by a single voice, the Neapolitans introduced not only the aria, but also choruses, duets, trios, etc. The Florentines had emphasized the *dramatic*, the Neapolitans emphasized the *musical* element. They also cultivated the form of the concert overture. (See OVERTURE.) Transferring the form of the *sonata da chiesa* to compositions for the clavichord, and introducing a secondary against a principal subject, they prepared the way for the modern sonata. The principal masters are Stradella, A. Scarlatti, Durante, Logroscino, Leo, D. Scarlatti.

XIII. *Early French Opera* (1645–1764).—After the Old French school had been supplanted by that of the Netherlands we have no more records of music in France until 1645, when a work of the Florentine monodic style was produced in Paris. The rise of the French drama through the works of Corneille, Racine, and Molière turned the general attention to the stage. Lully became the founder of a distinct school of French opera. The characteristics of this school are better dramatic characterization and the raising of the chorus to an active participation in the dramatic development. The orchestra also is increased by the addition of kettledrums and trumpets, and the character of the wood wind is recognized. The important names are Cambert, Lully, Marais, Rameau.

XIV. *Later School of Venice* (1650–1739).—The German Protestant masters had introduced a subjective and emotional element into their Church music. This became the keynote of the later Venetian masters. A distinctive feature is the development of some particular theme which begins in a low register and gradually rises higher and higher, leading to an effective climax. The growth of the orchestra also gave the composers an opportunity to heighten the effect of their vocal polyphonic works. The chief masters of this school are Legrenzi, Lotti, Caldara, Marcello.

XV. *English Music during the Restoration* (1660–94).—After the death of Gibbons in 1625 music declined rapidly in England. This decline was due to the unsettled state of affairs during the reign of Charles I and the fanaticism of the Puritans, who objected to the cultivation of music and destroyed many valuable manuscripts. When, at his accession in 1660, Charles II attempted a restoration of music, practically a new start had to be made. In spite of many drawbacks, however, music soon attained its former importance. Purcell, the greatest musical genius England has ever produced, now appeared, and under his inspiration English music rose to such a height that for a short time England boasted a national school of opera. The principal composers of the Restoration are Humfrey, Wise, Blow, Purcell.

XVI. *Italian Sonatists* (1620–1800).—Up to the seventeenth century the organ was the great means of developing instrumental music (toccata, ricercare, fugue). By the beginning of that century the violin had been considerably perfected and attracted a number of musicians in northern Italy. These composers prepared the way for our highest musical art form, the sonata. About 1650 a distinction began to be made between *sonata da chiesa* and *sonata da camera;* the former consisted of several movements of contrapuntal writing, the latter employed various dance forms. Great attention was paid to thematic development. The instrumental concerto was introduced and the *concerto grosso* was cultivated. The principle of musical dualism, first announced by Scarlatti, was strongly emphasized. While in the eighteenth century all the art forms in Italy declined, this school of sonata writers was the only one that made progress in the art. The principal masters are Legrenzi, Bassani, Torelli, Veracini, Corelli, Tartini, Boccherini.

XVII. *German Singspiel* (c.1630–1800).—1. In the beginning of the seventeenth century there arose in Germany the so-called school comedy—dramatic representations by students. Each act was preceded by a short musical dialogue introducing mythological personages. This custom led to the establishment of the German *singspiel* (q.v.), in which the acting personages were shepherds, shepherdesses, nymphs, etc. These *singspiele* finally gave rise to a national German opera in Hamburg, but not until Hiller in Leipzig established the *singspiel* upon the basis of the folk song did this form rise to an artistic level. The composers of this form are Strungk, Kusser, Keiser, Mattheson, Handel, Telemann, Hiller, Dittersdorf, Schenck, Weigl, Winter. 2. While the *singspiel* was popular with the masses, the German princes, decrying everything that was German, favored the Italian opera. Especially Vienna and Dresden became strongholds of the foreign style. Many German composers began to write Italian operas, and thus aided the rapid decline of dramatic composition. Among these composers we find Hasse, Graun, Doles, Naumann. See OPERA.

XVIII. *Decadence of Italian Opera* (c.1750–1810).—With the aria the Neapolitan school had given to music that form which was soon to bring about a general decline of dramatic music. Dramatic truth counted for nothing; sensuous charm of melody and display of vocal art were paramount. Composers became the slaves of singers. The ballet became an important factor in the opera. Naturally composers did not waste time in studying counterpoint and polyphonic writing when success was so easily won by writing pretty melodies over the plainest harmonic accompaniment. The principal names of this period are Porpora, Pergolese, Jommelli, Piccini, Sacchini, Paisiello, Salieri, Cimarosa, Zingarelli, Righini, Paër. See OPERA.

XIX. *Mannheim Symphonists.*—About the year 1740 a remarkable change of style is noticeable. Polyphony (q.v.) gave place to homophony (q.v.). While in their chamber music the Italian sonatists assigned to the first violin a leading part, to which all other instruments were very much subordinated, a group of German composers, mostly residents of Mannheim, took up the sonata form (q.v.), but by treating all instruments polyphonically made them participate in the thematic development. By emphasizing the second subject and making it participate in the general development as much as the principal subject, they created musical

dualism as a principle of the new style. Thus these masters originated the modern sonata and symphony and established the foundations of the modern orchestra. Above all these composers towers Johann Stamitz (q.v.), whose symphonies and chamber music strike a decidedly individual note and prove the new form capable of far greater freedom than the older forms of the severe contrapuntal art. Strange to say, for more than a century the work done by these Mannheim composers had been buried in oblivion, until early in the twentieth century Dr. Hugo Riemann discovered and republished these works, which are indispensable as the natural connecting link between the Italian sonatists and the great German classic masters. The most important composers of this group are, next to Johann Stamitz, his two sons Karl and Anton, F. X. Richter, Holzbauer, Schobert, Toeschi, Cannabich, J. C. Bach, Malder, Fraenzl, Beck, Eichner.

XX. *The Classic Masters* (c.1700–1827).—Bach marks the culmination of the polyphonic period of music (see Polyphony), as well as the beginning of the new homophonic-harmonic period. (See Homophony.) In him the *passion* (q.v.) and the *instrumental fugue* reach their highest development. He brings equal temperament (q.v.) into universal use. Handel brings the *oratorio* (q.v.) and the *vocal fugue* to perfection. Taking up English music where the premature death of Purcell had left it, he gives a new impetus to English music. Gluck reforms the opera by emphasizing the dramatic in opposition to the purely musical element, without, however, disturbing the forms of the aria, chorus, duet, ensemble, etc. He greatly advances the art of orchestration. Haydn takes up the new instrumental style of the Mannheim symphonists, perfecting the sonata form and considerably advancing the art of orchestration. Mozart invents no new forms, but fills those existing with the contents of his wonderful genius. He is a universalist, equally great in all the forms he handles. In the works of Beethoven absolute music reaches a point which would indicate the highest possible development, beyond which no progress can be imagined. He greatly enlarges the forms of Haydn and Mozart, and replaces the *minuet* (q.v.) of the symphony by the *scherzo* (q.v.). He strikes passionate accents never heard before in music, and discloses marvelous depths of emotion. Schubert creates the art song (*kunstlied*). (See Lied.) In the field of instrumental music he follows the path opened by Beethoven, but preserves his own strong individuality. See the separate articles.

XXI. *English Music since Handel* (1750–1829).—When Handel settled in England in 1718 the national opera of Purcell had been entirely superseded by the Italian. Handel's own Italian operas exerted no uplifting influence, and have shared the fate of the works by his contemporaries. But when Handel began to cultivate the oratorio he laid the foundation of his fame, which shed lustre on contemporary English music. Unfortunately, he remained the only master. His contemporaries and immediate successors were unable to carry on his work, although they made earnest efforts. They therefore turned their attention to the opera—not the foreign Italian product but the national English opera. They even succeeded in establishing a style of their own different from the German *singspiel* or the French *opéra comique*. The spoken dialogue occupied altogether too much space, and, although the musical numbers were not lacking in a certain freshness and melodious charm, they were utterly devoid of all dramatic expression. Hence this national opera died with its authors. The most prominent composers are Arne, Arnold, Dibdin, Storace, Hook, Shield.

XXII. *Italian Opera Buffa* (c.1730–1816).—The short intermezzi (q.v.), which originally were interpolated between the acts of the *opera seria*, were gradually expanded and finally completely separated from the serious work. While the *opera seria* treated tragic subjects of mythology, this new *opera buffa* treated comic situations drawn from everyday life. Logroscino (q.v.) may be regarded as the founder of this type. He also established the elaborate ensemble at the close of each act, which soon was also adopted by the serious composers. The first work of this kind which created a European sensation was Pergolese's *La Serva Padrona* (1734); the last and unsurpassed masterpiece, Rossini's *Il Barbiere di Seviglia* (1816). In our own day the *opera buffa* has been successfully revised by Wolf-Ferrari (q.v.) with his *Il Segreto di Suzanna* (1911), *Le Donne Curiose* (1912), and *Amore Medico* (1913). Several of the masters of the *opera seria* also excelled in this lighter kind. The principal names are, besides those mentioned, Leo, Hasse, Cimarosa, Paisiello, Piccini, Jommelli, Mozart.

XXIII. *French Opéra Comique* (c.1760–1870).—This school presents three sharply marked periods. The productions of the first period somewhat resemble the German *singspiel*. The subjects are taken from everyday life or fairy tales. The secco-recitative of the Italian *opera buffa* gives place to the spoken dialogue; for the aria is substituted the French *chanson*. The works of the second period (c.1800–30) show the influence of German romanticism. The purely comic subjects are replaced by a mixture of comedy and romanticism. The music assumes a more serious character, and better musical characterization is attained; the orchestra becomes an important factor, and the ensemble is strongly influenced by that of the *grand opéra*. In fact, some of the masters of the *grand opéra* belong equally to the *opéra comique* (Cherubini, Auber, Halévy). In the works of the third period we find very often that the only comical thing about them is their designation as *opéra comique*. Composers do not hesitate to choose tragic subjects. And yet such works are called *opéra comique*, because they differ from *grand opéra* by the fact that there is spoken dialogue. Nothing can very well be more tragic than Bizet's *Carmen*. But it contains spoken dialogue; hence it is *opéra comique*. In *opéra comique* there is generally a healthier musical atmosphere, less striving for mere effect, more truthful dramatic expression, less artificiality. The great masters of this school are Philidor, Monsigny, Grétry, Cherubini, Méhul, Isouard, Auber, Boïeldieu, Hérold, Halévy, A. Thomas.

XXIV. *French Grand Opéra* (1774–1864).—A peculiarity of the French opera is the fact that several of the masters who have contributed most materially to its advancement were foreign born. After the death of Rameau French national opera was at a standstill, and for some time the Italian opera gained ground. Then a

German, Gluck, appeared with his reforms. The success of his *Iphigénie en Aulide* in 1774 marks the beginning of a new era of French opera. The new style was taken up by two Italians, Cherubini and Spontini, who finally established the *grand opéra*. Then native French composers began to take part. The characteristics of this school are the prevalence of tragic subjects; the absence of spoken dialogue; the great attention paid to declamation, which very often degenerates into empty rhetoric and hollow pathos; a heavy orchestration, whose aim is for striking effects; and elaborate ensembles and finales. The introduction of a ballet after the second act is indispensable. In the choice of subjects those taken from history are specially favored. This school may be divided into two periods, roughly separated by the year 1830. The characteristics just mentioned apply more strictly to the second period (Meyerbeer); while the works of the first period, as a rule, are marked by a greater earnestness of purpose as far as the purely musical setting is concerned. The principal composers are: Gluck, Berton, Gossec, Cherubini, Lesueur, Spontini, Auber, Rossini (*Tell*), Meyerbeer, Halévy. See OPERA.

XXV. *Italian Bel Canto* (1813–68).—We have seen that the opera in Italy declined rapidly after the middle of the eighteenth century. With the appearance of Rossini a new school may be said to begin. Even before him singing was the chief attraction; but his predecessors relied upon the technical skill of the singers to please the audience. Rossini surpassed all Italian operatic composers before him in the charm of melodic invention. It is this sensuous charm of melody that distinguishes the school of the *bel canto* from the school of decadence. Besides Rossini, the principal exponents of this style are Donizetti and Bellini. Of only secondary importance are Generali, Mercadante, and Pacini.

XXVI. *German Romanticists* (1818–80).—The German romantic opera was developed from the *singspiel*. About the middle of the eighteenth century witches, gnomes, ghosts, and all kinds of spirits were introduced into the *singspiel*, which thus gradually gave rise to a new kind, the *zauberoper* (magic opera). Although the texts of these productions were silly, and the attention was distracted from the purely musical element to the scenic decorations, yet this *zauberoper* led opera into the realm of the mysterious, fantastic, and wonderful, where it has scored its greatest triumphs. The real beginning of the Romantic school is marked by the appearance of Weber's *Freischütz* (1818). With the appearance of romanticism music becomes more and more the individual, subjective expression of each composer, so that it is exceedingly difficult to arrange composers into groups. One characteristic of the Romantic school in general is the great advance in orchestral tone coloring over the classic masters and a decided preference for dissonances. Not only do the different instruments become so many separate voices, but a distinction is made even between the various registers of the same instrument. Harmony becomes greatly enriched and is the principal means of emotional expression, while rhythm assumes greater diversity and complexity. Music in general becomes more intense and passionate. The instrumental composers at first fill the classical forms with romantic contents, and then originate new forms. In the field of dramatic music the principal composers are Weber, Spohr, Marschner, Lortzing, Holstein, Nicolai, Flotow, Kretschmer, Goldmark, Götz, Nessler, Brüll. Those who devoted their energies to instrumental and choral works are Spohr, Schumann, Mendelssohn. The latter master has much in common with the classicists, and became the head of a school whose principal representatives are Hiller, Reinecke, Jadassohn, Hauptmann, Richter, Moscheles. The influence of Schumann is perceptible in another group of masters, of whom the most prominent are Franz, Volkmann, Jensen, Huber, Heller. Midway between these two schools, and preserving characteristics of their own, are Raff, Rheinberger, Wüllner, Klughardt.

XXVII. *German Lied* (1815–). The one form which was originated and brought to highest perfection by German masters is the *lied*. So specifically is it a product of German genius that other nations who have adopted the form have never attempted to translate the name into their own language. Long before Schubert German composers had written songs, frequently in conscious imitation of the simple folk song. But even Mozart, Beethoven, and Weber failed to recognize the possibilities of raising the song to the level of a high art form. In his very first lyrics Schubert surpassed all predecessors. In his short life he composed over 600 poems expressing the entire gamut of human emotions, thus proving the universality of his genius, and pouring out a profusion of divine melody. Successive masters enriched the piano part, until Hugo Wolf (q.v.), by transferring the principles of Wagner's music drama to the lied, endowed the instrumental portion with truly symphonic power. In Germany, at least, there is scarcely one composer of prominence since Schubert who has not cultivated the lied more or less. The fame of Robert Franz and Hugo Wolf rests entirely upon their imperishable masterpieces in this field. The masters who have materially contributed to the development of this form are Schubert, Schumann, Franz, Brahms, Mendelssohn, Liszt, Rubinstein, Grieg, Tschaikowsky, Jensen, Cornelius, Wolf, Strauss.

XXVIII. *Wagner, Liszt, Brahms* (1843–87).—Among the great German masters of the nineteenth century three stand forth so prominently that it is impossible to classify them. Wagner and Liszt became founders of two distinct schools, whereas Brahms stands alone, without followers. Wagner began as the successor of the romantic opera of Weber. His reformatory work is concerned, not with the opera in particular, but with dramatic composition in general. He emphasizes the drama and asserts that music must only follow and intensify the text. He considerably curtails the introduction of the chorus, ensembles, etc. The voices declaim in a highly dramatic kind of recitative, while the development of the musical ideas is assigned to the orchestra. The unifying principle of his works is the leitmotiv (q.v.), which constitutes the basis of the *musical drama* (q.v.). The music drama is a combination of the dramatic, musical, and plastic arts into one new art form. Wagner demands first of all a *drama*, not a text or libretto (q.v.); all the resources of music are to be employed towards a true interpretation of this drama; and the plastic arts are to combine with music. The orchestra is enormously enriched by new tone

colors and means of expression. (See MELOS; OPERA; WAGNER.) Liszt applied Wagner's principle of descriptive music to purely instrumental music and became one of the founders of modern programme music (q.v.). Unable to make the classic form of the symphony serve his purpose, he invented the *symphony poem*. In the field of piano music he becomes the originator, with Schumann and Chopin, of modern pianoforte technique. Together with Wagner and Berlioz he also laid the foundations of a new school of conducting (the interpretative conductor). (See CONDUCTOR; LISZT.) Brahms, in an age of musical excitement and innovations, stands forth as the keeper of classical forms. He successfully carries on the style of Beethoven's third period, faithfully preserving the form, but showing the possibility of filling it with new and original contents. Thus he proves that absolute music is unlimited in its scope and power of expression; that its capabilities were not exhausted even by the titanic Beethoven; that any original genius can employ those forms for conveying his ideas; that the polyphonic art of Bach can successfully be combined with the homophonic-harmonic art of Beethoven and with romanticism. See BRAHMS.

XXIX. *Berlin Academicians* (1830–1900).—While Brahms was not hostile to the development of music, a number of composers refused to recognize that romanticism was an advance in the art of music. They closed themselves to the new influences and sought their ideals in the past. The strongholds of this school were several Berlin institutions, notably the Singakademie. (See CHORAL SOCIETIES.) The energies of these masters were directed to the cultivation of the polyphonic style of the older Italian schools and Bach. But some of the later masters finally adopted the principles of romanticism. The important names are: Dehn, Grell, Kiel, Bargiel, Blumner, Becker, Bruch, Hofmann, Herzogenberg, Gernsheim, Moszkowski, P. Scharwenka, X. Scharwenka, Goldschmidt.

XXX. *Neo-German School* (1847–).—The beginning of Liszt's activity in Weimar in 1847 may be regarded as the commencement of this school. Liszt attracted a great number of young musicians who enthusiastically devoted themselves to the cultivation of programme music, carrying out Liszt's ideas. But the Neo-German masters did not devote their energies entirely to the field of instrumental music. Wagner's works attracted more and more admirers, and composers began to imitate him. Up to the present day a great many dramatic works constructed upon Wagner's principles have been written. The failure of all would seem to indicate that one might almost be justified in stating that Wagner's art form is one suited to his own gigantic genius, but hopeless for lesser masters. This would seem to be confirmed by the fact that the new dramatic works that have achieved success are all by non-German composers who adopted many of Wagner's ideas, but not his form in toto. The Neo-German school has been marked by earnest effort, but its composers have made no lasting impression. The only one whose work seems destined to outlive contemporary criticism is Richard Strauss, a man of pronounced originality. The dramatic composers of this school are Cornelius, Ritter, Bungert, Kistler, Humperdinck, Kienzl, D'Albert, Weingartner, Schillings, S. Wagner, R. Strauss, Blech, Reznicek, Urspruch, Pfitzner, Bittner, Braunfels, Istel, Kaskel, Thuille, Waltershausen, Zemlinsky. The instrumental composers are represented by Krug, Nicodé, Mahler, Hausegger, Boehe, Reger, Scheinpflug, Korngold, R. Strauss.

XXXI. *Modern Italy* (1851–).—Beginning about 1750 the history of Italian music is practically the history of the decline of the opera. When Verdi scored his first success in 1839 no one dreamt that this man, beginning in the degenerate style, would raise the Italian opera to a high level. In *Rigoletto* (1851) there is a very perceptible effort for dramatic truth and characterization, which the school of *bel canto* entirely ignored. The successive works advance along this line until in *Aida* (1871) we have a rare combination of exquisite melody, dramatic characterization, and truth of expression. *Othello* (1887) and *Falstaff* (1893) mark the culmination of Italian opera. Wagner's principle of dramatic truth is strictly observed. Nevertheless these works are not imitations of Wagner. Verdi has retained all the forms of the opera, but has knit them together into an artistic whole. The principle of the leitmotiv is not used. The orchestration shows a mastery never exhibited by any previous Italian composer. The influence of Verdi is noticeable in a number of composers known as the *Veristic* school (Mascagni, Leoncavallo). Among the many operatic composers, none of whom can approach Verdi, the following deserve mention: Boito, Ponchielli, Marchetti, Faccio, Coronaro, Puccini, Smareglia, Giordano, Montemezzi, Wolf-Ferrari, Zandonai, Catalani, Alaleona, Mulé, Molinari, Marinuzzi, Fano, Zanella. The elevating influence Verdi exerted upon dramatic music turned some serious composers to the field of instrumental and choral music, which had been sadly neglected in Italy. The principal instrumental and choral composers are Pincelli, Sgambati, Cesi, Grazzini, Mancinelli, Martucci, Franchetti, Perosi, Sinigaglia.

XXXII. *Modern France* (1830–).—So far we have spoken of musical development in France only in connection with the theatre. Instrumental music had not been cultivated to a very great extent. But we cannot disregard the name of the family of Couperin during the seventeenth and eighteenth centuries. Several members have become famous through their contribution to the perfection of the suite form. Under section XXIV the history of dramatic music up to the death of Meyerbeer has been given. Berlioz first awakened a deeper interest in instrumental music. This master was led to instrumental composition through the influence of Beethoven, but, uninspired by the classic forms, he became the originator of programme music (q.v.). His works, all conceived in large forms, lack symmetry of construction and have not yet found universal recognition. But Berlioz first aroused general interest in France for instrumental music and, independently of Wagner, did much for the art of orchestration. Soon other composers began to cultivate instrumental music; and these used the classical forms. After Berlioz's ideas of programme music had been adopted by Liszt, who established the symphonic poem as a recognized art form, French composers accepted the idea. All through the past century German classical and romantic influences have been at work in France. The mingling of these in-

fluences with the individuality of the French masters has been productive of excellent results, and to-day France can boast an influential instrumental school. The principal masters are David, Franck, Lalo, Saint-Saëns, Bizet, Delibes, Godard, D'Indy, Chausson, Hahn, Guilmant, Pierné, Ropartz, Schmitt, Ravel, Dukas, Fauré, Debussy, Vierne. But dramatic music did not remain at a standstill; the German romantic opera and lyric drama influenced French dramatic composers. Although the grand opera (the historic and heroic opera of Meyerbeer) was in danger of losing sight of dramatic truth in its striving after mere effect, the *opéra comique* and the later lyrical French drama are distinguished for truth of expression and successful musical characterization. Wagner's works have exerted only a wholesome influence, for French composers wisely did not imitate his form, but only followed the German master in the art of orchestration, as well as in a few other principles which can be safely adopted without danger of losing individuality. The most prominent dramatic composers are Gounod, Saint-Saëns, Bizet, Massenet, Chabrier, Guiraud, Reyer, Massé, Bruneau, Charpentier, Messager, Février, Aubert, Wolff, Leroux, Hue.

XXXIII. *Poland* (1830–).—The Slavic and Scandinavian nations took no important part in the development of music until the last century. (For a complete account the reader is referred to the articles on Scandinavian Music and Slavonic Music.) Polish music is chiefly represented by the works of Chopin, who is one of the founders of a new school of piano playing. His original harmonic combinations have become a great means in modern emotional expression. He also showed how embellishments can be made an important factor of expression. The other Polish masters show less national characteristics, and those living at present in Germany are more German than Polish. The principal Polish masters are Moniuszko, Kurpinski, Dobrzynski, X. and P. Scharwenka, Moszkowski, Zelenski, Noskowski, Karlowicz.

XXXIV. *Russia* (1836–).—The beginning of a distinct school may be dated from the first performance of Glinka's *Life for the Czar*. At first the national school cultivated chiefly dramatic composition, but soon composers turned also to instrumental music, in which line several have achieved marked success. The characteristics of Russian music are strength and great variety of rhythm, amounting almost to irregularity. The prominent masters are Bortnianski, Verstowski, Glinka, Dargomyshzki, Serov, Borodin, Cui, Balakirev, Mussorgski, Tschaikowsky, Rimski-Korsakov, Arenski, Glazunov, Rubinstein, Rachmaninov, Glière, Sapelnikov, Senilov, Vassilenko, Zolotariev, Taneiev, Tcherepnin, Rebikov. See Slavonic Music.

XXXV. *Scandinavia* (1840–).—Like the Russians, the Scandinavians established a distinct school by emphasizing the national element in music as it was presented in their folk music. Denmark made the beginning, but Norway soon took the lead. The characteristics of the school are an artistic use of dissonances and an emphasis of rhythm as well as melody. The principal masters are: Denmark—Berggren, Hartmann, Gade, Enna, Neilsen, Schiöler, Börresen; Sweden—Hallström, Södermann, Hallén, Sjögren, Stenhammar, Peterson-Berger, Alfvén, Aulin, Atterberg; Norway—Kjerulf, Svendsen, Nordraak, Grieg, Sinding, Hamerick, Cleve, Schjelderup. See Scandinavian Music.

XXXVI. *Finland* (1850–).—The beginnings of national Finnish music form a connecting link between the music of Scandinavia and Russia. The original folk music, brought into contact with German classicism, romanticism, and Wagnerism, soon yielded a typical national art music, quite distinct from that of Scandinavia, Russia, or Germany. Its development has been unusually rapid, and to-day Finland is almost the only country where impressionism has not arrested the natural progress of the national art. The important masters are Pacius, Wegelius, Sibelius, Kajanus, Järnefelt, Merikanto, Mielck, Melartin, Palmgren. See Finnish Music.

XXXVII. *Bohemia* (1860–).—The attempts of Russian composers to establish a national opera led Bohemian musicians to make the same experiment in their own country. A distinct Bohemian school may be said to begin with Smetana's *The Bartered Bride* (1866). Smetana also was the first notable instrumental master. He and, still more, Dvořák have made the Bohemian school famous, but the merit of the instrumental works overbalances that of the dramatic compositions. The forms cultivated are those of the German classic and romantic masters. The principal composers are Skraup, Skuhersky, Schebor, Rozkosny, Smetana, Dvořák, Fibich, Hřimaly, Albést, Weiss, Novak, Suk, Nedbal. See Slavonic Music.

XXXVIII. *The Netherlands* (c.1800–).—Although after the time of the great contrapuntal schools of the fifteenth and sixteenth centuries we meet no distinct school in the Netherlands, music was not neglected in those countries. But the influences of the neighboring countries, France and, especially, Germany, always predominated, thus preventing the rise of a national school. Both Belgium and Holland have produced a number of excellent composers. But the importance of the Netherlands during the nineteenth century rests more upon the contributions to musical history. In this line Belgian writers are second to none in the world. Without the labors of Fétis, Coussemaker, and Gevaert our knowledge of the musical past would be very incomplete. Besides, Belgium has produced some of the greatest instrumental performers (De Bériot, Vieuxtemps, Léonard, Servais, Ysaye). The more prominent of the composers are: Belgium—Janssens, Benoit, Mertens, Wouters, Van den Eeden, Tinel, Mathieu, Gilson, Blockx, Dupuis; Holland—Verhulst, Koning, Coenen, Silas, Hol, Thooft, De Hartog, Averkamp, Brandts-Buys.

XXXIX. *Modern Spain* (1890–).—Whereas in all other countries the influence of Wagner reacted unfavorably upon composers, this very influence proved a blessing in the case of Spain, because it effectively checked the strong Italian influences which had prevailed for three centuries and suppressed all originality. Fortunately Wagner was not blindly imitated; his influence acted more in the nature of a powerful stimulus. Operatic composers did not abandon national subjects nor the characteristics of their national folk melodies, but infused more seriousness into their work and strove for higher ideals. In the field of instrumental composition, however, almost all contemporary composers have adopted rather openly the idiom of the French impressionists.

The more important names are Bretón y Hernandez, Chapi, Pedrell, Albeniz, Granados, Manén. See SPANISH MUSIC.

XL. *Modern England* (1830–).—The predominance of spoken dialogue had caused the downfall of the English opera. About 1830 some English composers attempted to write national operas with a moderate amount of dialogue. The works of Weber assisted them in their efforts, but, as these earlier works were of a lighter character, English opera soon assumed the character of operetta. The appearance of Sullivan established this form upon a firm basis. In the field of grand opera England has as yet produced no successful work. The cultivation of instrumental music, through the influence of Beethoven, has yielded more satisfactory results, but the best work has been accomplished in the field of choral music. The modern English composers have not succeeded in developing a characteristic style, but their works show solid workmanship and mastery of form. The weak point is thematic invention; the themes lack spontaneity. The list of English composers is a very long one. The following deserve special mention: dramatic music—Bishop, Balfe, Barnett, Macfarren, Wallace, Benedict, Sullivan, Stanford; instrumental and choral music—Costa, Bennett, Barnby, Stainer, Parry, Cowen, Mackenzie, Coleridge-Taylor, Elgar, German, MacCunn, Holbrook, Bantock, Grainger.

XLI. *United States* (1880–).—We have seen that the English School of the Restoration (XV) was obliged to rebuild what the Puritans had destroyed. Music beginning in America with the Puritan psalm tunes and under Puritan influence naturally could not develop. Its growth came only with foreign influences; and even then considerable time had to elapse before any works by American composers appeared. About the middle of the eighteenth century operatic performances of foreign works (chiefly English) began to be given, and before the end of the century crude attempts at original composition in the smaller forms can be chronicled. Not until early in the nineteenth century performances of better operas and larger vocal and instrumental works had resulted in a certain degree of musical culture, did any native composers attempt some of the larger forms. Naturally all these early efforts show no trace of originality. Among the more prominent of these pioneers—all born before 1850—may be mentioned Fry, Bristow, Paine, Pratt, Millard, Penfield, Buck. The work of their immediate successors, though still lacking the strong individual note, and showing largely German influence, is of vastly better quality and occasionally rises to the level of distinction. The principal composers of the latter half of the nineteenth century are Chadwick, Foote, Whiting, Bird, E. Nevin, Bartlett, Shelley, B. O. Klein, Gleason, Kaun. Far above them towers MacDowell (q.v.), a man of striking individuality. Withal, it would be difficult to point out in his works anything specifically American. In order to produce typically American music two ways have been tried—the introduction of Indian themes and of negro melodies. Neither method has yielded the desired result; for neither the Indian nor the negro represents the American nation of to-day. The national music of all European nations has been reared on the immense store of their respective national folk melodies, accumulated for centuries; and not until there exists a similar abundance of typical American folk melodies will the American composer have the necessary basis for a national music which shall be characteristic of the American nation of some future day. Since the beginning of the present century French influence has gradually been superseding the German, and the majority of the younger composers, in spite of all experimenting with Indian and negro melodies, follow in the wake of the Impressionists. Among the more prominent of the composers of the present day are Herbert, Parker, Stillman-Kelley, Loeffler, Hadley, Saar, Strube, Busch, Converse, A. Nevin, Stock, Brockway, Cadman, Stojowski, Humiston, Mrs. Beach, Kroeger, Powell, Kramer.

TWENTIETH-CENTURY TENDENCIES (1900–)

At no time in the history of any art does the end of a century coincide exactly with the close of a period of artistic activity, and all boundary lines drawn around certain art periods are more or less arbitrary and invariably overlap. Most tendencies in the music of the present day have their beginnings in the last century, but have developed or assumed definite shape within the present century. It is, then, chiefly as a matter of convenience that the year 1900 is taken as a dividing line.

After the death of Wagner and the universal recognition of his genius his influence during the last two decades of the nineteenth century dominated not only dramatic composition but every form of music, without, however, producing much of value. When the composers realized the futility of their efforts in this direction they cast about for something new. "Originality at any cost" became the watchword. Beethoven, Chopin, and Wagner, men of extraordinary inventive power, made sure that they stood upon the solid foundation laid by their great predecessors before they struck out along the new paths which inner necessity impelled them to follow. They never lost sight of the fundamental principles. To-day the case is just the reverse. Composers whose chief shortcoming is lack of thematic invention disregard fundamentals and seize upon accidentals, which are emphasized out of all proportion to their intrinsic value or importance. Thus their harmonic system is founded, not upon the eternal basis of consonance, but upon dissonance. Excessive modulation has practically obliterated tonality. The remarkable advance in orchestral technic, instead of being a blessing, is really a curse, since it originated in a desire to hide insignificant musical ideas under a dazzling exterior. Pure music is no longer written for art's sake, but to express something or other. This frantic striving for "expression" has resulted in deadly monotony, for the constant employment of strange harmonies and an enormous technical apparatus make climaxes and contrasts impossible. Twentieth-century music addresses itself to the nerves, that of the preceding century to the heart.

This modern tendency is known as impressionism. It originated in France during the last century, and for some time its principal and practically only exponent was D'Indy. (See INDY.) The great success of Debussy (q.v.) at the beginning of the present century led composers, irrespective of nationality, to adopt

this new idiom. Just as Wagnerism had done before, so now impressionism has leveled all distinctions as to nationality and individuality. Although each belongs to a different nation, Samazeuilh, Scriabine, Albeniz, Szymanowski, Scott, Loeffler, Rangström, all are Impressionists, all write the same idiom, and a work by any one might as well have been the work of any other member of the group. Whereas with Debussy this language is natural and free from the excesses of the imitators, it soon became a caricature. These imitators seized on the idea of creating only "mood" or "atmosphere," a procedure that relieved them of the necessity of thematic invention and logical development. The compositions of Futurists appeared on the programmes of many of the world's foremost organizations. Conditions during and after the World War appeared to favor the spread of these futuristic tendencies among younger composers.

The following are the principal exponents of Futurism: FRANCE: The group known as "Les Six" [Auric, Durey (deserted in 1921), Honegger, Milhaud, Poulenc, Tailleferre], Grovlez, Inghelbrecht, Samuel-Rousseau, Satie. ITALY: Camussi, Casella, Malipiero, Mangiagalli-Pick, Marinetti, Molinari, Mulé, Oddone, Ottolenghi, Pizzetti, Pratella, Respighi. GERMANY: Fried, Kaiser, Schönfeld, Schreker, Wellesz. RUSSIA: Prokofiev, Rebikov, Skriabin, Stravinsky. ENGLAND: Bax, Bliss, Goossens, Holst, Ireland, Quilter, Scott, Somerville, Williams. HUNGARY: Bartók, Stojanovits. POLAND: Rózicky, Szeluta, Szymanowski. SPAIN: Albeniz, de Falla. UNITED STATES: Bloch, Carpenter, Griffes, Loeffler, Ornstein, Schelling, Whithorne.

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H. Riemann's *Musikgeschichte in Beispielen* (3 vols., Leipzig, 1911) contains 150 specimens of compositions of all styles from the thirteenth to the eighteenth centuries.

See LIED; OPERA; ORATORIO; OVERTURE; PROGRAMME MUSIC; SONATA; SYMPHONY; BACH; BEETHOVEN; BRAHMS; CHOPIN; DEBUSSY; SCHUBERT; SCHUMANN; STRAUSS, RICHARD; VERDI; WAGNER.

MUSIC, MILITARY. See BAND, MILITARY.

MUSIC, PSYCHOLOGY OF. The psychology of music deals with the mental processes which furnish both the motives for its production and the ground of its appreciation. It has an individual and a social aspect; for music as an art involves not only the individual consciousness, as such, but also, since it is a means of expression and communication, the modification of one mind by another. See MUSIC.

The mental elements primarily involved in music are sensations of tone. Of the 10,000 tones which may be distinguished in consciousness, music uses a comparatively small number. Our own elaborate musical system includes only 85 or 90, ranging from about 40 to 4000 vibrations per second—something less than seven octaves. The simple tonal sensation is produced by an uncompounded pendular vibration of the air. The note (compound tone or simple clang) is composed of a number of simple sensations, called partials or partial tones, one of which (the lowest) is the fundamental; the others are called overtones. The character (timbre, clang tint, quality) of the note is determined by the number and relative intensity of the various partials. (See CLANG TINT, EXPLANATION OF.) Every simple tone has several aspects or attributes—pitch (high or low); intensity (loud or soft); duration (long or short); tonality (the octave relation; every c or d of the scale is, in a sense, a repetition of every other c or d); volume (large or small). By the combination and variation of these attributes, although some are more important than others, all classes and forms of music are produced. There is, first of all, the combination of qualities and intensities in the note or compound tone, which is the practical basis of music. Above this stand the alternations of intensity, which produce rhythm (q.v.); the successive rise and fall of pitch, which forms the essence of melody; and the synchronous combination of pitches (see FUSION), known as harmony. The attribute of tonality has doubtless played a part, along with fusion, in determining the limits of scales and in the development of form. These, however, are only the materials: the psychological problem is, first, to inquire into the specific manner in which they are employed, and, secondly, to discover the motives and the nature of the psychological processes which gave rise to the production of music. Our primary task, therefore, is the analysis of music itself; and since our own music has developed not only in a high degree but also in a single direction, we must study other musical systems as well. Research of this kind has been made possible in recent years by the collection of phonographic records of exotic music from all parts of the world. The largest and most representative series (more than 5000 phonograms) is housed in the psychological laboratory of the University of Berlin, where under the direction of Stumpf the work of transcription and comparison is steadily going forward. Enough has already been done to afford some insight into the principal factors which determined the origin and development of music.

The starting point is to be found in the innate tendency to give expression to feelings and ideas by bodily movements. (See EXPRESSION, EXPRESSIVE MOVEMENTS.) When expressive movements are used with intent to communicate, language appears first in the form of gesture (q.v.) and later in that of vocal utterance. It is not, then, until sound becomes a medium of communication that we may expect the step which leads directly to the origin of music. Vocal utterance could not in itself have given rise to an art of music; for many insects, birds,

and most of the higher vertebrates below man produce sounds without exhibiting the slightest evidence of an intent to employ them in the sense in which we speak of music as an art. An examination of the earliest forms of music reveals the fact that primitive man had somehow recognized a fairly constant relation between tones, and upon this relation his music was based. No hypothesis of the origin of music, therefore, which fails to take account of this fact can be satisfactory. Darwin's theory that music arose by way of sexual selection, Spencer's theory that it began with the cadences of speech, and Buecher's theory that it developed out of the natural tendency to produce sounds while working in rhythm, are accordingly all at fault. This basal relation, however, is of two kinds—consonant interval and tonal distance. They are alike in that both are differences between the pitch of tones; they differ in that the former are recognized and felt as such, may be reproduced independently of any fixed pitch, and are as a consequence readily transposed, while the latter are approximately equal steps from a principal tone, as if distance were successively added to distance. All *primitive* music is based, apparently, on the one or the other of these relations, although there is one instance at least, the Malu music of Murray Island, where both appear to have been recognized independently. Stumpf derives the perception of consonant intervals from vocal signals or calls which demand the production of a fixed and relatively high tone more musical in character than the indeterminate pitch of ordinary speech. If the calls are given in concert by men, women, and children, whose voices vary by octaves, fourths, and fifths, we have, in Stumpf's view, the optimal conditions for the recognition of these particular intervals, to which smaller intervals are later added. However that may be, the evidence goes to show that these three intervals do in fact furnish the basis of many primitive melodies. A characteristic example is found in the Sarawak music of Borneo, which appears to be based upon the descending fourth; within this interval one tone frequently appears, and occasionally a second tone, while the interval itself furnishes the framework of the melody. Fifth and octave, however, are also employed.

How the principle of tonal distance came to be discovered we can only guess—perhaps from a playful manipulation of the vocal apparatus, perhaps from the rhythmical intonation of words in an approximate monotone, such as occurs in the ceremonies of certain American Indians. At any rate, melodies of this type seem to be the oldest form of primitive music, and the purest in the sense that they have taken shape without the aid of musical instruments. In one instance, that of the Veddas of Ceylon, the successive tones rise and fall about a principal note. If, as frequently happens, the entire melody consists of two or three notes of different pitch, the principal tone is the lowest; if, however, the range covers four or five tones, the principal tone is the last but one. The tones are further grouped into small phrases or motives, which are repeated with slight variations. The Malu music of Murray Island, mentioned above as a case in which both tonal distance and consonant intervals appear, seems originally to have been of the distance type. In the earlier forms the melodies consist of short rhythmic phrases which descend by approximately whole tones until a low pitch is attained, when a return is made to the pitch at which the melody began and the entire melody is repeated. In later forms the octave is found either as a descending *portamento* at the end of the melody or as a rise when the low point of the melody is reached. The fifth seems to enter solely through confusion with the octave. Still later these intervals are employed more freely, as consonants in melody that is otherwise based on tonal distance. We have finally to consider a form of exotic music, not primitive but highly sophisticated, which may have been derived either from tonal distance or from consonant interval. The Javan and Siamese scales are formed by dividing the octave into equal steps; in the former there are five, in the latter seven intervals. Since the intervals are equal, these isotonic scales may be regarded as artificial examples of tonal distance; but since the consonant octave forms the starting point for the mathematical division, and the fourths and fifths are impure, they may also be regarded as degenerate forms of a music originally based on consonance. The latter hypothesis seems the more probable.

When we compare the two fundamental forms of melody, the one based on interval, the other on tonal distance, with regard to their inherent possibilities of development into music like our own, the former is decidedly superior. It is true that in the Vedda melodies we find a principal note which suggests the keynote of Occidental music, and the recurrence of phrase or motive which has played so important a part in the general development of musical form; but these are also found in Sarawak music. Moreover, the employment of consonant intervals not only permits of ready transposition, which results in a greater freedom of outline, but also makes possible a true polyphony and the ultimate acquisition of harmony. The development of music, therefore, when taken as a whole, seems to have been largely conditioned upon the discovery of, and the feeling for, consonant intervals. We have now to seek for the motives which furthered its growth and the characteristics which marked its progress. The chief motive is to be found in the religious ceremonials of primitive society. The dance, which was an important feature of the ceremonials, was accompanied by the voice and by at least one musical instrument, the drum. We may expect it, therefore, to impress its rhythm upon the gradually developing melodies.

Melodies themselves, however, are conditioned upon the organization of successive tones into unitary groups or wholes; for melodies are not constructed of successive sounds with determinate pitch relations; the sounds are bracketed together into a motive with a recognized individuality, much as a number of articulate sounds combine to form a word which seems to be simple and unitary. And just as a poem is built with words, so is a melody constructed of motives. At first these motives are quite short and are repeated over and over again, as in the following phrase of the aborigines of

Australia. Next there is a slight variation of the motive in repetition, and the new form may again be repeated many times, perhaps with a final return to the original form. Then the motive is transposed a fourth or a fifth in the repetition. Gradually the number of repetitions becomes less and the variation more frequent. The nature of variation, in exotic music, is often exceedingly complex; whereas in our own system it is usually limited to the direction of the tonal movement and to the rhythm, in exotic music it includes minute changes in pitch, in stress, and in the method of attacking the notes. Furthermore, exotic music shows form qualities which belong not to the motives but to the melodies taken as wholes. The characteristic of Malu music, where there is a general downward tendency of the melody, is an early instance of melody form; but in some cases the melody forms are so subtle as to be almost indiscernible to our ears; thus, the Ragas of India are melody forms of such intricacy that, although a native singer is able to say in what Raga his song is composed, the European can scarcely distinguish one Raga from another.

The rhythm of exotic music, because of its purely melodic character, has also developed in a manner foreign to that of our music. The reason is that concerted singing and playing, with attention directed to the harmonic effect, tend to force the music into two-part or three-part rhythms, while the more free melodic forms have permitted a rhythmic development of great complexity. Thus, in exotic music, not only are five-part and seven-part rhythms common, but combinations of these with two-part or three-part rhythms are also not infrequent. It often happens, too, that a melody produces one rhythm while the drum which accompanies it plays another and a different rhythm; cases are even reported in which several rhythms are played simultaneously. Rhythmic forms are also known; the Talas of India stand to rhythm as the Ragas to melody. Those of a simpler type consist of short rhythmic motives, played on drums, which may be repeated or otherwise developed in much the same way as the melodic motive. The melodic and rhythmic forms seem to mark the end of the development of pure melody or homophony. Further development follows, apparently, from the combination of melodies, which eventually leads to harmony.

While, as has been said, true harmony is not found in exotic music, we yet observe phenomena which seem to represent its first beginnings. There are numerous instances of organum, i.e., of the singing of melodies in parallel octaves, fourths and fifths, in some cases (the Solomon Islands) even in parallel thirds, sixths, and seconds. Examples are also found of bourdon, or vocal organ point, in which a single tone is sustained throughout the melody, either above or below, or, if there are two additional voices, the one above and the other below. Or again there may be an alternation of two or more notes in rhythmic figures, much as in our ostinato or ground bass. There are also cases, found throughout the Far East and also in the Sudan, to which Stumpf has given the name of heterophony—cases in which one instrument plays a melody while the other members of the orchestra play more or less free variations of the theme, a practice which is thought to have been common in old Greek music. Finally, there are evidences of a nearer approach to our polyphony, when several different melodies are sung simultaneously but only occasionally come into unison or consonance. Since polyphony has played so important a part in our own musical history, and since our feeling for harmony is the product only of the last few centuries, it seems reasonable to suppose that the rude polyphony of exotic music is a link connecting it with Occidental music. The chief characteristics of our system have already been pointed out—the supreme importance of the keynote or tonic, the relative simplicity of rhythm, and the dominance of harmony over melody. It may be added that in the harmonic structure of sonata form, with its modulation from the tonic to the key of the dominant, followed by the free excursion into other keys, with a subsequent return to the tonic, we find a harmony form which is comparable to the melody forms and the rhythm forms of exotic music.

The important steps in the development of music thus seem to be (1) the perception of tonal distance and of consonant interval; (2) the organization of the tonal material either about a principal note or in motives; (3) the further organization of the motives into a melody; (4) the combination of melodies with regard to consonance; and (5) the development of harmony. When we attempt to describe the psychological motives and processes which underlie the whole complicated structure, we must be content, in the light of our present knowledge, with broad generalizations. Throughout the entire development of music we have the underlying fundamental tendency to give expression to feelings and ideas. With this as the basis the first two steps follow as a result of the universal determining tendency to discriminate, to organize discrete elements into wholes and to give them meaning. Musical meaning, however, is not an intellectual meaning, in the sense that it can be put into words; it is the affective, æsthetic, and empathic response which the organism makes to tonal stimuli, and it is carried by the group of organic and kinæsthetic sensations, plus whatever imagery there may be, which accrues to a tonal experience. The third step follows again from the preceding; but now the feeling to be expressed is particularized; the composer has something to say and may have a more or less conscious plan for saying it; he is guided at every point by emotional reaction, by æsthetic judgment, by the logic of his art. This set of principles then gives rise to the fourth and fifth stages of development; the composers who produced our music a few centuries ago found consonance more pleasing, more beautiful, and more logically satisfying than anything melody could give; and our system is the result.

The conditions of the appreciation of music are the same as those of its production, with the difference that the listener interprets a meaning which the composer has sought to express. But the elements of which music is made are so numerous, and the dispositions which the listener brings to the hearing are so varied, that differences in appreciation may be very considerable, both as between individuals and in the same individual at different times. The auditor who brings to the hearing a sufficient culture finds his greatest pleasure in the unfolding of the work of art, in apprehending the

development of the musical idea, perhaps also in appreciation of the composer's skill in the handling of his materials, or in the adequacy of the performance. Another type of auditor, or even the former in certain moods, bathes in the flood of feelings and emotions which are directly aroused by the music. A third type finds its chief enjoyment in the motor reactions set up by the rhythm of the music; in this case the rhythmical element alone makes a strong appeal. Finally, there is a type that finds in music a stimulus to the imagination; whose principal pleasure lies in reverie, in dreaming day dreams. These types, however, are neither rigid nor permanent; a shift of attitude towards the performance brings a change in the mode of enjoyment. The universal enjoyment of music is due to its manifold nature and to the corresponding multiplicity of its appeal.

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MUSIC, SACRED. See SACRED MUSIC.

MUSICAL ART SOCIETY. See CHORAL SOCIETIES.

MUSICAL DICTATION. A branch of musical training of very recent date. The instructor sings or plays short musical selections or phrases which the pupil is required to fix in musical notation on paper. The object of musical dictation is not only to train the ear, but chiefly to develop the power of quickly grasping and fixing musical ideas. The beginning is made, of course, with simple melodies progressing in simple intervals. Gradually melodies with more difficult intervals are introduced. The next step is to melodies with a simple harmonic basis. A class for musical dictation was established at the Conservatory in Paris in 1871. Some of the German conservatories soon followed (Hamburg, Dresden, Karlsruhe, etc.). Consult: Albert Lavignac, *Cours complet de dictée musicale* (Paris, 1882); H. Götze, *Musikalische Schreibübungen* (Breslau, 1882); F. L. Ritter, *Musical Dictation* (London, 1886); Hugo Riemann, *Katechismus des Musikdiktats* (Leipzig, 1889).

MUSICAL DRAMA, or MUSIKDRAMA. A term now generally employed to distinguish the later works of Wagner (*Tristan und Isolde, Die Meistersinger, Die Nibelungen, Parsifal*) from his earlier ones, or operas (*Rienzi, Der fliegende Holländer, Tannhäuser, Lohengrin*). Of a musico-dramatic work Wagner demands that the literary drama be the first and music the second consideration; whereas in the opera the music was almost the sole consideration. In his introduction to *Oper und Drama* Wagner declares emphatically: "The error in the art form of the opera consisted in the fact that a *means* of expression (music) was made the *end;* the *end* of expression (the drama) a *means.*" After *Lohengrin* Wagner wrote chiefly theoretical works dealing with the method to be followed by the poet and composer in the production of a new form of art which was to take the place of the opera. Several years elapsed before he began the composition of *Die Nibelungen,* according to his new artistic convictions. In the musical drama the fundamental material from which the music is constructed is the *leading motive.* (See LEITMOTIV.) By this means artistic unity is obtained, whereas in the opera the different *numbers* may be artistic wholes, but can never be welded intimately together into the higher unity of the entire drama. Wagner's musical dramas have exerted a powerful and lasting influence upon all dramatic composers. For full information, the reader is referred to Wagner's *Oper und Drama,* vols. iii–iv of his *Gesammelte Schriften und Dichtungen* (Leipzig, 1887). See also MELOS; OPERA; WAGNER.

MUSICAL FESTIVAL. The performance of some large choral or orchestral work with a very large chorus or orchestra. The real era of musical festivals begins with the festival performances of the great Handel Commemoration held in London from 1784 to 1787 and again in 1791. It is true that previous to this time regular musical festivals were held in England, but they were practically unknown on the Continent. In England choral singing had always been more extensively cultivated than in any other European country, and the efficiency of English choirs led Handel to turn his attention in the direction of writing for large choral bodies in his oratorios. Since the first performance of *The Messiah* in 1749 it has remained a custom in London to perform that work with greatly augmented chorus and orchestra every year at Christmas. These performances on a grand scale in the English capital roused a feeling of national pride in the Germans, who felt that the great master belonged to them by birth. Festival performances of Handel's oratorios were first given in Berlin on the London plan and were imitated in other German cities. Soon the works of other composers were performed in a similar manner. And as on such occasions there was always a large orchestra, it was but natural that this body of instrumentalists was utilized in the performance of large orchestral works. Thus, at the beginning of the nineteenth century several organizations devoting their energies to the production of any great work, whether choral or purely instrumental, sprang into existence in various parts of Germany. Among these the oldest and even to-day most famous are the Gesellschaft der Musikfreunde in Vienna and the Niederrheinische Musikfeste, which take place yearly in some city of the lower Rhine district. The United States has not been behind in following the example of England and Germany, and many festivals are held yearly in several of the larger cities. On such occasions it is nothing unusual to find a chorus numbering from 1000 to 2000 voices and an orchestra of from 100 to 200 performers. These musical festivals have also powerfully affected the mode

of conducting and have done very much towards establishing the universal custom of conducting by means of the bâton. Whereas formerly the conductor always presided at the piano, the handling of large bodies of singers and players necessitated the undivided attention of the conductor upon those whom he directed; and the singers, in turn, became likewise more dependent upon signs and gestures from the conductor. See CHORAL SOCIETIES; CONDUCTOR; and for an account of the principal musical festivals, see BAYREUTH MUSICAL FESTIVAL; BETHLEHEM MUSICAL FESTIVAL; CINCINNATI MUSICAL FESTIVAL; GESELLSCHAFT DER OESTERREICHISCHEN MUSIKFREUNDE; GEWANDHAUS-CONCERTE; LEEDS MUSICAL FESTIVAL; LOWER RHENISH MUSICAL FESTIVAL; SACRED HARMONIC SOCIETY; SALZBURG FESTIVAL; SOCIÉTÉ DES CONCERTS DU CONSERVATOIRE; SONS OF THE CLERGY; TONKÜNSTLER-SOCIETÄT; THREE CHOIRS FESTIVAL; WORCESTER FESTIVAL.

MUSICAL GUILDS. See GUILD.

MUSICAL INSTRUMENTS. The origin of many musical instruments dates back to the earliest times. Not a few of these ancient instruments are the prototypes of some of our modern ones. Monuments recently unearthed at Thebes and in the upper valley of the Nile contain representations of harps and flutes; and the relation of our modern instruments to the old Egyptian models is not difficult to perceive. In the case of other instruments the relationship is not so easy to trace, owing to the considerable modifications which they underwent in the course of centuries and in passing from one nation to another. Even so recent an instrument as our grand pianoforte can be traced through its many and vital changes to the dulcimer (q.v.), known to the Arabs and Persians. Hand in hand with the evolution of the art of music went the invention and perfection of musical instruments. Many of these were extensively used and admired in their day, but soon were superseded, so that to-day our museums are filled with various instruments of all times and nations preserved only as curiosities. Thus the large family of lutes is now entirely obsolete; and yet at one time these instruments enjoyed the same popularity as the pianoforte does to-day, and no orchestra was complete without them. If we except the stringed instruments, it may safely be asserted that no instrument found in the modern orchestra is the same as it was a century ago. All the instruments of the wood-wind family have been vastly improved; the natural horns and trumpets have given way to the improved valve horns and trumpets; the serpents and ophicleides have been entirely superseded by the trombones and tubas. It may be said that the modern orchestra comprises the best and most efficient instruments now known, and the test for admission into this select family is sonority and beauty of sound. Musical instruments are generally divided into four large groups, according to the manner in which the sound is produced, viz.: (1) stringed instruments, (2) wind instruments, (3) instruments of percussion, (4) keyed instruments. This latter group embraces the organ and pianoforte, the former being really a wind, the latter a stringed instrument. Both organ and piano differ from the other instruments of those groups in the use of a keyboard.

Stringed Instruments. Stringed instruments are divided into two principal classes: (*a*) those in which the tone is produced by drawing a bow made of horsehair across the strings, (*b*) those in which the tone is produced by plucking the string either with the fingers or a small instrument called *plectrum*. The instruments of class (*a*) have but few strings (generally four), and depend for the production of their complete range upon stopping, i.e., shortening the vibrating portion of the string by means of the fingers. To this class belong (1) the violin, (2) the viola, (3) the violoncello, (4) the double bass (qq.v.). Some of the instruments of class (*b*) have few strings like those of class (*a*); others have a separate string for each note. Those having few strings are: (1) the mandolin, (2) the guitar, (3) the banjo. Those having many separate strings: (1) the zither, (2) the harp (qq.v.). Formerly there were in use instruments that were played with a bow, which also had additional strings to be plucked with the fingers. (See THEORBO.) Among the stringed instruments by far the most important are those constituting the viol family, class (*a*). The present perfection of these instruments is the result of a slow evolution of possibly a thousand years. But so far we have no evidence whatever that any instruments of the viol family were known in antiquity. Because Arabic authors of the fourteenth century mention stringed instruments, it was supposed for some time that viols originated in the Orient. This has been disproved by Gerbert, who in the second volume of his *Musica Sacra* published a representation of a European stringed *lyra* of the ninth century very similar in shape to the later *giga*. Even earlier, however, the crowd (q.v.) was known in Wales. For several centuries viols were built in two shapes—either with a flat body like the violin or with a pear-shaped body like the mandolin. During the fifteenth and sixteenth centuries stringed instruments of all possible varieties of shapes were built. These, however, were all superseded in the course of the following two centuries, when the art of violin making reached its height. After the violin had been perfected the same attention was also bestowed upon the instruments of lower pitch of this family, such as the bratsche, viola da gamba, viola d'amore, etc. (See VIOLIN; VIOLONCELLO.) A full account of how the viol family came to be the foundation of the modern orchestra will be found under ORCHESTRA.

Wind Instruments. Under this heading are included all instruments on which the tone is produced by setting a column of air in motion. According to the material from which they are made, they are subdivided into (*a*) wood-wind instruments, (*b*) brass instruments. Many of the wind class are transposing instruments, i.e., the tones actually produced upon them are not the same as those written for them. Let us take the clarinet family as an example. The compass of the clarinet in C is from e to c^3. It is possible to obtain notes below and above this range by building clarinets in different keys. Thus the clarinet in A produces the same series of tones a minor third lower, so that the lowest tone is c♯ and the highest a^3. The clarinet in E♭ produces the tones a minor third higher, so that its lowest tone is g and its highest $e♭^3$. Hence the music for any transposing instrument must be written in a key *above* or *below* the key of the composition by the same interval as the key of the instrument is *below* or *above* C.

MUSICAL INSTRUMENTS

1. ÆOLIAN HARP
2. THEORBO
3. LUTE
4. CROWD or CRWTH
5. HURDY-GURDY
6. ALPENHORN
7. COR ANGLAIS
8. BARYTON
9. MONOCHORD
10. REBEC
11. SHOPHAR
12. LYRE

From the Crosby Brown Collection in the Metropolitan Museum of Art, New York

For instance, a piece is written in A♭ major and the composer desires to employ the E♭ clarinet. Since every tone sounds a minor third higher than the written note, it is necessary to write this particular clarinet part in a key lying a minor third below A♭, i.e., in F. See TRANSPOSING INSTRUMENTS.

a. The Wood Wind.—The instruments belonging to this class are generally made of wood, but ivory is also used, and quite recently flutes have been made of silver. The instruments of the wood-wind family are: (1) the flute, (2) the piccolo (a small flute with very shrill tones), (3) the oboe, (4) the English horn, (5) the heckelphone, (6) the clarinet, (7) the bassoon, (8) the double or contra bassoon, (9) the saxophone, (10) the sarrusophone, (11) the flageolet (qq.v.). This last instrument was extensively employed by Gluck and Mozart, but is now obsolete. Of the wood-wind instruments the English horn, the clarinet, the saxophone, and the sarrusophone are transposing instruments, as was also the flageolet. All the wood-wind instruments have a rich, mellow tone approaching that of the human voice more closely than any other instruments.

b. The Brass.—The members of this class consist of (1) the horn, (2) the cornet, (3) the trumpet, (4) the trombone, (5) the tuba, (6) the ophicleide, (7) the serpent (qq.v.). The two last named are obsolete. With the exception of the trombone, all these instruments are transposing instruments. The tones produced by brass instruments are distinguished as *natural* and *harmonic* tones. The former are produced upon the open tube by regulating the force of the air current by means of the lips; the successive tones produced are the harmonics or overtones of the fundamental. (See HARMONICS.) All tones produced by the aid of the valves are called harmonic tones. In the case of the trombone the length of the vibrating air column is regulated not by valves but by a slide. Formerly the horns and trumpets had no valves, and these instruments are to-day called *natural* horns and trumpets. To produce a complete scale on them it was necessary to insert the left hand in the opening. They have now been entirely superseded by the valve horns and trumpets. The trumpets must have undergone considerable change since the days of Bach and Handel, for in the works of these masters we find passages written for trumpets which no one can execute to-day. All the brass instruments are built in many keys, so that it is easily possible to write four-part harmony for only one group of brass instruments. For instance, in the case of trombones there are four varieties—the alto, tenor, bass, and double-bass trombone. The latest additions to the family of brass instruments are the tubas, which Wagner had constructed especially for his *Ring des Nibelungen.* See TUBA.

Instruments of Percussion. The instruments of percussion may be divided into two principal classes: (*a*) those which have definite pitch, (*b*) those which have not. The former class comprises: (1) the kettledrums, (2) the glockenspiel, (3) the xylophone, (4) the celesta. The latter class includes: (1) the bass drum, (2) the small drums, (3) the tambourine, (4) the tamtam, (5) the cymbals, (6) the triangle, (7) the castanets (qq.v.). The chief use of instruments of percussion is for marking the rhythm. Those instruments that are devoid of definite pitch are capable only of rhythmic figures; whereas the glockenspiel and xylophone can play melodic figures as well. Of all the instruments of percussion the kettledrums are the most important and most generally used.

For description of the keyed instruments (*pianoforte* and *organ*), the reader is referred to the extensive special articles.

Under the above headings the instruments at present in use in the orchestra have been described in their general features and especially in their relation to other members of the same family. Besides the instruments mentioned, many others have been in use in former times. There are still others in actual use, but as they are not employed for music of a high character, they have not been discussed. The following is a list of instruments of these classes: alpenhorn, bagpipe, basset horn, bugle, cembal d'amore, chimes, clavichord, concertina, crowd, dulcimer, flügelhorn, glass chord, harpsichord, hurdy-gurdy, jew's-harp, kazoo, krummhorn, lur, lute, lyre, ocarina, psaltery, shawm, spinet, theorbo, viol, virginal. Instruments of the nations of antiquity and of Oriental nations are treated in the special articles on the music of those nations.

Besides the instruments employed in musical performances there are a few that are built solely for the purpose of acoustic experiments. These are (1) the monochord, (2) the siren, (3) the tuning fork (qq.v.).

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MUSICAL NOTATION. The art of expressing musical compositions in writing by means of certain conventional signs called notes. The oldest system of notation of which we have any knowledge is the *alphabetical notation* of the Greeks. The detailed descriptions of this system left to us enable us to decipher without much difficulty the few remnants of Greek music recently discovered. The Greeks employed uncial letters which appeared in a great variety of positions—inverted, sideways, divided in halves,

etc. Thus no less than 120 different combinations were obtained.

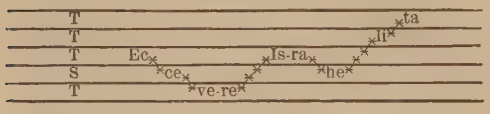
Example 1.

ABΓΔEZHΘI

Long after the downfall of Greece this system of notation remained in use, especially in the writings of the theorists. During the sixth century A.D. Roman letters were first used. Boëthius employed the first 15 letters of the alphabet; but these were later reduced to seven and applied to the degrees of the scale. These letters—as the Greek letters had also been—were placed in a straight line above the syllables of the words. Although in themselves sufficiently definite, the letters did not present to the eye the rising or falling of the melody, as does our modern notation. This need gave rise, in the eighth century, to a series of dots, hooks, curves, and peculiar figures which were placed above the syllables of the text at distances proportionate to the musical pitch of the note. These characters are known as *neumes*. (See NEUMES.) From a combination of the signs of these neumes and the alphabetical notation arose our modern system. But its progress was slow, and the complex system of *mensurable music* (q.v.) had first to outlive itself before the present simpler system was established.

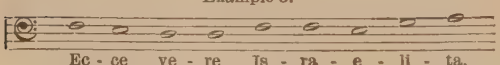
The Stave. The introduction of lines we owe to the neumes. In the tenth century Hucbald took up the idea of using lines. He wrote the syllables between the lines, and at the beginning he indicated by the letters T and S whether the voice was to proceed by tones or semitones.

Example 2.



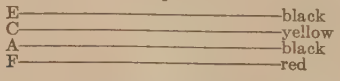
This, in modern notation, reads

Example 3.



By increasing the number of lines Hucbald was enabled to write even four-part compositions in this manner. Soon after his time dots were used *on the lines*, leaving the spaces vacant, and the degree of the scale was indicated by a Greek letter placed at the beginning of each line. But the great number of lines necessary rendered the reading of this manner of notation difficult, and it was soon abandoned. Guido of Arezzo in the eleventh century added two black lines to the red and yellow lines of the neumes, in such a manner that the upper black line above the yellow represented E and the second black line, drawn between the yellow and red lines, A.

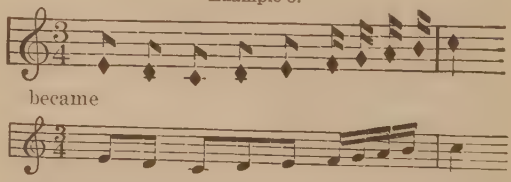
Example 4.



Whereas before his time only the spaces *or* the lines had been used, Guido made use of both lines *and* spaces. The advantages of this system were so obvious that this stave was soon adopted in every country of Europe. As long as music was homophonous, i.e., consisted of only a single melody, this stave answered all purposes. But the growth of polyphony soon rendered a greater number of lines and spaces an absolute necessity. No one seems to have thought of the simple idea of writing each voice on a separate stave. Instead the four lines were extended to six, eight, twelve, and even more. In the Paris Library there is a score, dating from the middle of the thirteenth century, in which all the voices are written on a single stave. The difficulty of reading scores written in this manner led musicians to adopt a uniform stave of nine lines arranged in two groups, each containing four black lines. The two groups were separated by a red line. In the fifteenth century we find three staves employed for different kinds of music. Plain-chant melodies were written on a stave of four lines; all other vocal music on a stave of five lines; and a stave of six lines was used for all compositions written for the organ and virginal. After the invention of music printing the five-line stave became the universal standard of all music, except the plain-chant melodies, which to this day are written on a stave of four lines.

The Form of the Notes. As long as music had no distinctive rhythm of its own and the musical accents were determined only by the word accent, Guido's system of using simple dots answered all purposes. But it was not long before the need of notes having a fixed time value made itself felt. Franco of Cologne, in the twelfth century, replaced the dots by notes of various shapes to indicate their relative duration. He also indicated the time value of pauses or rests by a series of signs corresponding in duration to the different notes. A full account of this complicated system will be found under MENSURABLE MUSIC. This system has become the foundation of our modern system of notation. The notes of larger value, the *large*, *long*, and *breve*, have disappeared, *the semibreve* having become our standard of value or *whole* note. The development of instrumental music during the eighteenth century brought with it a great advance in the technique of the instruments, and this led composers to write passages requiring more rapidity of execution than is possible to obtain from choral masses. Round notes were substituted for the square ones, because the former can be written more easily and rapidly. Another important innovation, and one which greatly facilitated the reading of scores, was the joining of all notes having hooks into groups readily recognized by the eye. Thus a passage which formerly was written

Example 5.

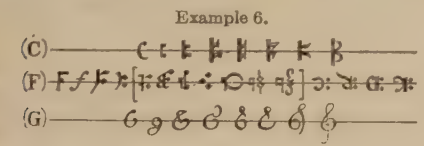


Whereas formerly the *semifusa* (corresponding to our sixteenth) was the note of smallest value, the increased rapidity rendered possible by instrumental technique led to a subdivision of sixteenths into thirty-seconds, and of these latter even into sixty-fourths. The signs denoting the rests in mensurable music have been adopted into the modern system without modification.

The Clefs. The oldest of the clefs is the F clef, which in its original form as a red line dates back to the tenth century. Almost as old is the C clef, which originally was a yellow line. These colored lines were used without a clef signature, as it was understood that every note upon the red line represented F and every note upon the yellow line C. Later on the colored lines disappeared, black ones being substituted and the letter F or C placed at the beginning. (See NEUMES.) The modern forms of these clefs are the result of a series of modifications of the plain letters.

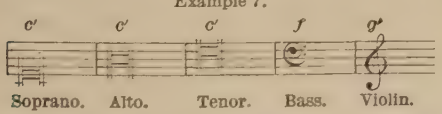
The G clef is more recent than the other two, but its present form is the result of similar changes of the letter G.

Example 6.



Originally the different clefs had no fixed position as they have to-day. In order to avoid the use of ledger lines (which, in fact, were unknown), the position of the clefs was constantly shifted, so as to bring the range of every voice within the limits of the stave. In old manuscripts we find every clef, at various times, on every line of the stave. Even within the same melody the clef changes frequently. This arbitrary use of the clefs continued until the seventeenth century. The establishment of opera (q.v.) brought with it the introduction of many new instruments. To bring the range of all these instruments within the limits of the stave could not be accomplished any longer by the transposition of clefs. Previously some polyphonic writers of the sixteenth century had on very rare occasions resorted to the use of a single ledger line above or below the stave. This idea was taken up by the operatic composers, and thus ledger lines became a fixture in music. Now that there was no longer any need for the constant transposition of clefs, the positions of those that remained in use became definitely fixed. Each voice part had its own clef, as also the violin.

Example 7.



In this form the classic masters have used the clefs. For the pianoforte the G and F clefs are used; the higher-pitched orchestral instruments play with the G clef, those of lower pitch the F clef. The viola is the only one for which the alto clef (C) is retained. During the nineteenth century the C clefs were superseded even in vocal music by the G clef.

Time Signatures. Before the introduction of mensurable music there was no need of time signatures. The signatures used in mensurable music will be found in the special article on MENSURABLE MUSIC. When, in the seventeenth century, the bar was introduced, composers soon saw an opportunity for reducing the very complicated and cumbrous time signatures of mensurable music. The underlying principle of rhythmic division into binary and ternary forms still remained the basis. But, whereas in the older system ternary division (perfect) was the principal consideration and binary division (imperfect) only secondary, the new system inverted these relations by recognizing only binary division as natural. Ternary division was retained, but was regarded only as a modification of the natural binary division and obtained by the use of a dot which increased the value of the note by one-half. Moreover, all notes were referred to the whole note (the semibreve of mensurable music) as the standard of value. Thus, the whole note was divided into two half notes, each half note into two quarters, etc. The time signatures of this new system were expressed by fractions, the denominators indicating the subdivision of the standard whole note and the numerators the number of subdivided notes to be allotted to each measure. The only signs still retained from mensurable music are the semicircle for common time (four quarters in a measure) and the semicircle with a line (alla breve), where the line still has the meaning of reducing the notes to half their duration.

The Bar. The earliest example of the use of vertical bars is found in Agricola's *Musica Instrumentalis*, which was published in 1528. The object of these bars, however, was only to keep the notes of the different voices one under the other, rather than to indicate rhythmic divisions. A few original drafts of older compositions give evidence that composers during actual composition did use bars to indicate the rhythm, although all the part books up to the seventeenth century were printed without bars. The general use of bars we owe to the early composers of operas. Peri, in 1600, published the score of his *Eurydice* exactly as he had written it. In order to indicate clearly the connection between the different notes in the voices and accompanying instruments he drew vertical lines through the whole length of the stave. Caccini and Monteverde adopted this plan. The great facility of reading music printed in this way immediately led to its universal adoption. The new system of music, having established new signatures for time, allotted a certain number of beats to each bar, and in this way the bar became what it is to-day.

Accidentals. In spite of the strict laws governing plain chant and the use of the old Church modes, the human ear from the earliest times felt the need of a leading tone. The tone of the scale that was subject to this modification was B. Thus at a very early time this letter was written in round (♭) and later square (♮) form to indicate whether the lower or higher tone was to be sung. It is easy to see how from these two forms arose our flat and natural (♭♮). Towards the end of the thirteenth century the sign ♮ was carelessly written ♯, and being applied to other tones than B, denoted the higher of the tones on the same degree. Thus, F♯ denoted the modern F♯. but F♭ was the same as our F natural, just as B♭ was regarded as the *natural* tone and B♯ (our B) a chromatic alteration of B♭. As a key signature the sign ♭ appears first in the Church modes, but denoted only a transposition of the original mode. (See MODES.) Even in the eighteenth century a ♭ was used as a sign of resolution for a note having a ♯ or ♮ (these two signs were identical); and vice versa a ♯ or ♮ served to resolve a ♭. The signs of the double sharp and double flat (×, ♭♭) cannot be traced further back than the

beginning of the eighteenth century. The sign × arose from writing the older ♯ in this position 𝄪. Before the beginning of the seventeenth century accidental sharps, flats, or signs of resolution appeared very seldom in writing. The singer was supposed to introduce the necessary chromatic alterations during the actual performance. As long as the Church modes reigned supreme no use was made of regular key signatures. A flat or sharp placed at the beginning of a piece denoted only transposition. But as soon as the modern major and minor scales displaced the modes the necessity of key signatures arose, in order to avoid the great number of accidentals.

Expression Marks. Towards the end of the eighth century we find in one old manuscript written in neumes small letters interspersed with the characters of the neumes. These letters refer to the expression. We find a small *f* (*fragor*), *b t* or *t* (*bene teneatur* or *teneatur*), *c* (*celeriter*), etc. This manuscript is the famous Antiphonary of St. Gall. The works of the great polyphonic masters of the fifteenth and sixteenth centuries are utterly devoid of any marks of expression, nor are any evidences of expression marks to be found in works written between the eighth and fifteenth centuries. There really was no pressing need for such marks, for all music was vocal, and the text gave a sufficient clew to the singers, who were all thoroughly trained musicians. But the development of instrumental music gave rise to various marks of expression. Hand in hand with the development of instrumental music went the perfection of the musical instruments. Many new effects were discovered, and to express these composers were obliged to use words. Monteverde in his opera *Orfeo* (1608) demands that the trumpets play with mutes, and this is indicated in the score by the words *con sordini*. The same composer introduced a number of new effects in his *Tancredi e Clorinda* (1624), among which were the *tremolo* and the *pizzicato* for strings. Such effects were called for by the actual words placed in the score. These are the earliest instances of expression marks. Operatic composers immediately followed the practice established by Monteverde. Among the earliest of purely instrumental masters who employed words to help the performers was Frescobaldi (1583–1644). He was particularly careful to indicate the tempo. One of his favorite marks is *adagio*. Soon the words *allegro*, *largo*, *grave*, *moderato* came into general use. In the course of the eighteenth century nearly all the important marks of expression and time were in use. The nineteenth century substituted convenient signs for some of the most frequently recurring marks, such as *crescendo* <, *diminuendo* >, *staccato* . . . . , *legato* ⁀, *sforzando* ∧, etc., and increased the vocabulary of musical expression considerably. Some of the German masters of the last century, notably Schumann and Wagner, attempted to substitute a German terminology for the Italian. But the Italian terms are more definite, because two centuries of constant use have familiarized them to musicians of every nationality.

Another system of musical notation used formerly, especially for the lute, is discussed under TABLATURE. For the new system of designating chords by figures, used in theoretical treatises, see NUMERICAL NOTATION.

Bibliography. A complete history of musical notation was written by H. Riemann: *Studien zur Geschichte der Notenschrift* (Leipzig, 1878); an abridgment of this is the same author's *Die Entwicklung unserer Notenschrift* (ib., 1881); id., *Geschichte der Musiktheorie im IX.–XIX. Jahrhundert* (ib., 1898); C. F. A. Williams, *The Story of Notation* (London, 1903); Johann Wolf, *Geschichte der Mensuralnotation* (Leipzig, 1904); Guido Gasperini, *Storia della semiografia musicale* (Milan, 1905); A. W. Gehrkens, *Music Notation and Terminology* (New York, 1913). See GREEK MUSIC.

MUSICAL SAND. There are a large number of beaches, oftentimes, however, of very small extent, whose sand has the peculiar property of giving out a distinct musical tone when stepped upon. The musical note appears to depend upon the fact that the grains of sand are of such very uniform size that, as they slip past each other under pressure, the vibrations of the particles respectively reënforce each other so that sounds which would otherwise be inaudible become distinct, and the crunching noise which is heard when the foot presses down upon snow or ordinary sand becomes a clear musical note.

MUSIC BOX. A case containing mechanism constructed in such a manner that music can be produced automatically. Machines for making mechanical music have been known since the invention of clocks, but real music boxes were not introduced till after 1750. They have been greatly improved since then, and some modern musical boxes can play over 100 tunes. The mechanism is similar to that of the barrel organ. The principal parts are the comb, the cylinder, and the regulator. Bells, drums, and castanets are frequently added to produce musical effects, and there are occasionally combinations of reeds and pipes. The musical boxes of Prague, Sainte-Lusanne in France, and Geneva, Switzerland, are especially famous.

MUSIC DRAMA. See MUSICAL DRAMA.

MUSIC FESTIVAL. See MUSICAL FESTIVAL.

MUSIC OF THE SPHERES. See HARMONY OF THE SPHERES.

MUSIC RECORDER. See MELOGRAPH.

MUSIL, mōō-zēl′, ALOIS (1868–). An Austrian Orientalist, born at Rychtarov in Moravia. He studied theology at Olmütz and attended the Ecole Biblique of Jerusalem (1895) and the University of St. Joseph at Beirut (1897). He was afterward at various times in London, Cambridge, Berlin, and Constantinople, and became a professor in the University of Vienna. His 11 exploring expeditions in the Holy Land were of particular importance for his investigations of eastern Palestine. In 1910 he claimed that he had identified Mount Sinai. He published valuable maps, based on actual surveys, of Arabia Petræa (1:300,000; 1907), Kuseir 'Amra, and northern Arabia, and wrote: *Arabia Petræa* (1907 et seq.); *Nord-Arabien* (1908–09); *Im nordlichen Hegâz* (1910); *In nord-ost Arabien und Süd Mesopotamien* (1913).

MU'SIMON. See MOUFLON.

MUSIN, mụ′zăn′, OVIDE (1854–). A Belgian violinist, born at Nandrin, near Liége. He studied at the conservatory of that city under Heynberg and Léonard, followed the latter to the Paris Conservatory, where in 1868 he won a gold medal, and taught for a year before leaving on his European and American concert tours that ultimately led him around the world. In 1898 he became violin professor at the Liége

Conservatory, but continued to spend much time in the United States. In 1908 he established the Musin Violin School in New York.

MUSK, or **MUSK DEER** (OF., Fr. *musc*, from Lat. *muscus*, from Gk. *μόσχος*, *moschos*, from Ar., Pers. *musk*, musk, from Skt. *muska*, testicle, mouse, from *mus*, to steal). An aberrant deer of the subfamily Moschinæ, which differs from ordinary deer in the lack of antlers, in the possession by the male of long upper canines which project downward outside the lips, and in certain anatomical features. Hence there has been much discussion whether the animal should be included in the Cervidæ. There is only one species, *Moschus moschiferus*, of the high Himalayas, Tibet, and eastern Siberia—a small animal which stands about 20 inches high and has a clumsy form. Its favorite haunts are the tops of pine-covered mountains, but its summer range extends far above the region of pines. Its habits are nocturnal and solitary, and it is extremely timid. It is much pursued by hunters on account of its odoriferous secretion, which has been known in Europe since the eighth century and is much valued as a perfume.

Musk. This secretion is produced in a glandular pouch situated on the hinder part of the abdomen of the males, and its natural use seems to be that of increasing sexual attractiveness. The musk bag, or pod, is formed by an infolding of a portion of the skin of the belly, within which a number of membranes are contained, and between these membranes are glands by which the musk is secreted. When newly taken from the animal, musk is soft and almost resembles an ointment; it is reddish brown and has an excessively powerful odor. Very little of it reaches Europe unadulterated. Musk is usually imported either in the form of grain musk, i.e., the musk which has been collected chiefly from stones upon which it has been deposited by the animal, in which state it is a coarse powder of a dark-brown color; or in the pod, dried with the musk inside. Of both kinds the annual importations to the United States are about 15,000 ounces, chiefly from China and India. Small quantities are used in medicine, but the greater part is employed by perfumers. The kinds generally known in trade are the Tonquin, or Chinese, and the Carbardine, Kabardine, or Siberian, which is inferior. Genuine musk has the valuable property of adding to the permanency of other odors. On account of its properties as a stimulant and antispasmodic, it is also used to some extent in medicine.

Consult Sir William Flower, a monograph in *Proceedings of the Zoölogical Society of London* (London, 1875), and Richard Lydekker, *Deer of all Lands* (ib., 1898). See PERFUMERY, and Plate of FALLOW DEER, MUSK, ETC.

MUSKAT, mŭs-kăt'. A town of Arabia. See MUSCAT.

MUSKAU, HERMANN LUDWIG HEINRICH, PRINCE PÜCKLER. See PÜCKLER-MUSKAU, H. L. H.

MUSK DUCK. 1. A very large Australian sea duck (*Biziura lobata*), which has a musky odor. The male is decidedly bigger than the female and has a lobe of skin depending from its chin. 2. The muscovy duck.

MUSKEGON, mŭs-ke'gŏn. A city and the county seat of Muskegon Co., Mich., 40 miles by rail northeast of Grand Rapids and extending 7½ miles along the south shore of Muskegon Lake from Lake Michigan to the mouth of the Muskegon River. It is the largest city and harbor on the east shore of Lake Michigan, with all-year steamship service to Chicago, Milwaukee, and other ports, and is on the Pere Marquette, the Grand Rapids, and Indiana, the Grand Trunk, and the Grand Rapids, Grand Haven, and Muskegon (interurban) railroads (Map: Michigan, C 5). Much fruit, celery, and garden truck are shipped annually, and the principal manufactured products are furniture and office equipment, pianos, refrigerators, billiard tables, curtain rollers, knit goods, paper, boats, electric cranes, motors, and machined and cast automobile parts. The industries are greatly facilitated by two dams on Muskegon River which develop 75,000 horse power. Resorts in the vicinity attract summer tourists in great number. Through the liberality of Charles H. Hackley the city possesses a fine art gallery, a public library, a hospital, public square, many statues, a gymnasium, and grammar, high, and manual-training schools fully equipped—all maintained through endowments by the donor. Under a charter of 1901 the city is governed by a mayor, elected annually, and a unicameral council. Muskegon Heights, an industrial suburb, and North Muskegon, though closely affiliated with Muskegon, have separate city charters and administrations. The water system, supplied from Lake Michigan, is operated by the city; gas, electric, and street-car systems are privately owned. Jean François Recollet established a trading post here in 1812; Muskegon was incorporated as a village in 1861 and chartered as a city in 1870. During the early eighties it was one of the largest lumber-producing cities in the world, but now has no mills. Pop., 1900, 20,818,; 1910, 24,062; 1914 (U. S. est.), 25,442; 1920, 36,570.

MUSKELLUNGE, mŭs'ke-lŭnj. A common variant of maskinonge (q.v.).

MUSKET. See SMALL ARMS.

MUSKHOGEAN (mŭs-kō'gē-an) **STOCK.** A North American Indian stock which derives its name from Muscogee, the principal tribe of the Creek Confederacy. (See CREEKS.) This is one of the most important linguistic stocks of the United States. It formerly occupied the greater portion of the territory of the Gulf States east of the Mississippi and comprised the Creek, Choctaw, Chickasaw, Seminole, Apalachee, Alibamu, Koasati, and Natchez, speaking perhaps five distinct languages, with several minor dialects. The difference was greatest between the Muscogee and the Choctaw proper, of which the Chickasaw was a dialectic form. The Seminole is a mixed dialect, based chiefly upon Hichitee, the prevailing language of the Lower Creeks, formerly residing on the Chattahoochee River. The old Mobilian trade language was based upon Choctaw.

Their authentic history begins with the first landing of the Spaniards on the Gulf coast under Narváez in 1527. Thirteen years later De Soto traversed their country from east to west, finding the various tribes in practically the same positions which they occupied up to the period of their final removal to Oklahoma. For three centuries their history is closely interwoven with that of colonization and conquest by the Spaniards, French, and English in the Southern States. Each tribe or village made such alliances as suited its purpose, with the exception of the Chickasaw, who, like the Iroquois in the North, remained the steady allies of the English and, by their command of the

waterway of the Mississippi, were able to check the advance of French colonization by cutting off communication between Louisiana and the Illinois settlements. The Apalachee of Florida were Christianized at an early period by the Spanish Franciscans, but the entire tribe was exterminated by the English and their Indian allies about 1702 and the country left an uninhabited wilderness until it was gradually occupied by vagrant bands from the Creek Confederacy, later known as Seminole, or runaways. The Yamasi of South Carolina were driven from their homes in 1715 as a result of a war with the English and retired to Florida. The Muskhogean tribes played little part in the French and Indian War, but the Creeks took a particularly active part with the English against the Americans in the Revolution. This warlike confederacy again rose against the neighboring American settlements in the War of 1812 and, by the opening massacre at Fort Mims and the desperate encounters at Talladega and Horseshoe Bend, made the Creek War one of the bloodiest pages in American history. The two Seminole wars, which cost the government years of effort and over $40,000,000, further illustrated the fighting temper of the Creek tribes. By these wars and successive treaty sales the Muskhogean tribes were rapidly dispossessed until by the year 1835 practically the whole body had been removed to the west of the Mississippi. Here the four principal tribes, the Creek, Choctaw, Chickasaw, and Seminole, reestablished themselves as nations under organized governmental forms in Oklahoma, where they now reside.

All the Muskhogean tribes were sedentary and agricultural, residing in compact and regular towns and villages, frequently palisaded, and always with a central town house for councils and other public ceremonies, fronting upon a plaza or public square for outdoor gatherings. Their social organization was complex and exact, the rank and duty of each clan being specifically fixed in the tribe. Consult: James Adair, *History of the American Indians* (London, 1775); A. S. Gatschet, *Migration Legend of the Creek Indians* (Philadelphia, 1884–88); J. C. Pilling, *Bibliography of the Muskhogean Languages* (Washington, 1889); J. R. Swanton, *Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico* (ib., 1911).

MUSK HYACINTH. A bulbous plant. See Grape Hyacinth.

MUSKINGUM, mŭs-kĭn′gŭm. The principal river of eastern Ohio. It is formed at Coshocton by the junction of the Walhonding and Tuscarawas rivers and flows southeastward 112 miles through a rich agricultural region, entering the Ohio River at Marietta (Map: Ohio, G 6). The Ohio and Erie Canal follows its course as far as Zanesville, and slackwater navigation has been secured to Dresden, 92 miles from the mouth of the river.

MUSK MALLOW. A tropical plant. See Mallow; Hibiscus.

MUSK′MELON (so called from its peculiar aromatic flavor), *Cucumis melo.* An annual herbaceous vine of the family Cucurbitaceæ, a native of the warmer parts of Asia and now cultivated in both hemispheres for the sake of its rounded or ovate fruit, which, in its numerous varieties, varies from a few inches to more than a foot in diameter. The rind varies in appearance and texture, and the flesh may be white, red, green, yellow, or of intermediate colors. The muskmelons commonly grown in North America belong to the subspecies *cantalupensis,* or cantaloupe, and *reticulatus,* or nutmeg or netted melons. The cantaloupes are distinguished by their hard, more or less warty and furrowed rinds. They are usually long-season varieties and are commonly grown in the southern United States. The nutmeg varieties have a softer, more or less netted rind, mature sooner than cantaloupes, and are commonly grown in the more temperate regions of North America. As a special truck crop, however, nutmeg or netted melons are also grown in the South and are commonly but improperly classed as cantaloupes. There are smooth-rinded strains of the nutmeg melon, but fruit of the netted strains which fail to develop the netting are apt to be inferior in quality. Muskmelons require a warm, quick soil. In field culture they are planted—6 to 10 seeds—in hills 4 to 6 feet apart either way. To hasten growth and on poor soils two or three shovelfuls of well-rotted manure are placed under each hill. In the North commercial growers start the plants under glass, preferably in a hot bed, and transplant them to the open field when the weather becomes warm enough. The seedlings are transplanted with difficulty and are therefore usually grown on inverted sods or in pots. Other subspecies of *Cucumis melo* are: var. *saccharinus,* or pineapple melon, a sweet-fleshed variety; var. *flexosus,* or snake melon, 2 to 3 feet long and 1 to 3 inches in diameter, sometimes grown for preserves, but more often as an oddity; var. *chito,* also called orange melon, vegetable orange, garden lemon, vine peach, etc., and used for pickles and preserves; var. *inodorus,* a long keeper of poor quality; var. *dudaim,* or pomegranate, dudaim, or Queen Anne's pocket melon, a highly perfumed but inedible sort. See Plate of Cucumber Allies.

The striped beetle and flea beetle are serious pests of muskmelons. Spraying with Paris green or dusting with tobacco dust, air-slaked lime, or road dust when the plants are moist helps to keep the insects under control. Land plaster (q.v.) mixed with kerosene or turpentine is used for the same purpose. The downy mildew and leaf-spot diseases which attack the plant are held in check by applications of Bordeaux mixture. See Fungicide.

MUSKOGEE, mŭs-kō′gē, or **MUSCOGEE.** A city and the county seat of Muskogee Co., Okla., about 130 miles east-northeast of Oklahoma City, on the Missouri, Kansas, and Texas, the St. Louis and San Francisco, the Midland Valley, and the Missouri, Oklahoma, and Gulf railroads (Map: Oklahoma, F 3). It is the seat of St. Joseph's College (Catholic), the Spaulding Female Institute (Methodist), Oklahoma Woman's College (Methodist), and near by is the Bacone Indian University (Baptist), opened in 1884. The noteworthy features include the new post-office building, costing $500,000, a splendid high school, Carnegie library, traveling men's club, town and country club, public parks covering 100 acres, fair grounds, and in the vicinity Fort Gibson, and a national cemetery. Among the more important industrial establishments are hardware and mattress factories, railroad shops, wagon-wood plant, oil refineries, corrugated iron and steel works, and manufactories of oil-well supplies, agricultural

implements, and cotton goods. The surrounding region is adapted to agriculture and stock raising, and oil and natural gas are found in abundance. Muskogee owns its water works, which are valued at $1,000,000. The city adopted the commission form of government in 1910. Pop., 1900, 4254; 1910, 25,278 1914 (U. S. est.), 38,309; 1920, 30,277.

MUSKOKA, mŭs-kō'kȧ. A lake region of Ontario, Canada, bounded on the north by the Carry Sound district, on the east by Haliburton, on the south by Simcoe, and on the west by Georgian Bay (Map: Ontario, E 3). The region covers an area of about 4000 square miles, 800 feet above the sea and 200 feet above Lake Huron. Besides a lake, river, and county of the same name, it includes extensive forests, several rivers, and from 800 to 1000 lakes and smaller sheets of water. Fine waterfalls also occur, of which the most important are the Bridal Veil Falls on the Shadow River and the High Falls and the South Falls, with a descent of 130 feet, on the Muskoka, near Bracebridge (q.v.). The chief lakes—Muskoka, 20 miles long and 2 to 8 miles broad, Rosseau, 12 miles long and 1 to 6 miles wide, and Joseph—are connected and have regular steamer navigation service in summer, in connection with the Grand Trunk, the Canadian Atlantic, and the Canadian Pacific railways, which traverse the region. The forests abound in game and the lakes with fish, and the district has become popular for its hunting, angling, boating, and bathing.

MUSK OX. The musk ox (*Ovibos moschatus*), although approaching cattle in size, is really quite as closely allied to the sheep. It undoubtedly belongs in the family Bovidæ and is perhaps entitled to have a subfamily division to itself. The genus contains only the single species, at present confined to Arctic America, but formerly ranging over the northern United States as far south as Kentucky and over northern Asia and Europe also, as is shown by the bones found in the Pleistocene deposits of those regions. Its southern limit is gradually retreating northward, and there can be little doubt that the number of musk oxen is steadily declining. The name "musk ox" or "musk sheep" refers to a peculiar musky odor, the origin of which seems to be in doubt; apparently, however, there is no special gland, as in the musk deer and other musky mammals. The legs are short and stout, so that the animal is somewhat lower than a small ox, which it otherwise resembles in size and shape. The hair is amber brown, woolly, and long; thick, matted, and curly on the shoulders, giving the appearance there of a hump; elsewhere it is straight and hangs down so as to conceal the short tail and upper half of the legs. The wool has been spun into fabrics said to be extremely soft. The hoofs are remarkable in being asymmetrical, the outer half being rounded, while the inner is pointed; the sole of the foot is hairy. The head is inclined to be massive, especially in old males, where the horns have extremely broad bases. The latter are elegantly curved, first obliquely downward and backward by the side of the head and then upward and forward. The ears are so small as to be concealed by the hair, and the muffle is hairy, as in sheep and goats. The flesh is coarse-grained, but of variable quality, some individuals being tender and of good flavor, while others are tough and so musky as to be uneatable. Curiously enough, the difference in flavor is apparently not a matter of age or sex. Musk oxen are gregarious, going in flocks of 20 or 30, or rarely as many as 80 or 100, and are said to be very sheeplike in their habits. Although the legs are so short, they run with speed and can climb steep slopes and clamber over rocks with remarkable agility. The young are produced, one at a time, at the end of May or early in June, and the rutting season is in September. The food of the musk ox is grass, moss, lichens, and tender shoots of willow and pine. They are themselves an important item in the larder of the Eskimos and of Arctic explorers. The writings of these explorers contain the best accounts of the animal, whose young have now and then been brought alive to Europe. Consult: Julius Schiött, *Musk Oxen in Captivity* (Washington, 1904); Caspar Whitney and others, *Musk Ox, Bison, Sheep, and Goat* (New York, 1904); J. A. Allen, "Ontogenetic and Other Variations in Muskoxen, with a Systematic Review of the Muskox Group, Recent and Extinct," in *American Museum of Natural History, Memoir*, vol. i (N. S., New York, 1913). See Plate of WILD SHEEP AND MUSK OX with the article SHEEP.

MUSK PLANT, MUSK ROOT, MUSK TREE, MUSK WOOD. Various plants possessed of a musky odor. Among these are the common musk plant (*Mimulus moschatus*); the musk tree (*Olearia argophylla*) of Tasmania; the musk okra (*Hibiscus moscheutos*); the musk mallow (*Malva moschata*); the musk tree of Jamaica (*Trichilia moschata*); and the West Indian musk wood (*Guarea grandifolia*), used in perfumery. The drug called musk root or sumbul, brought from Asia principally through Russia and Persia, is the starchy root of *Euryangium sumbul*, which has a pure musky odor and is used as a substitute for musk.

MUSK'RAT (so called from its musky odor), or MUSQUASH. The muskrat (*Fiber zibethicus*, or *Ondatra zibethica*) is one of the most widely distributed and best known of North American quadrupeds and is peculiar to this continent. It makes its home in the banks or water of streams, ponds, and lakes. It is the largest known species of the subfamily Microtinæ of the family Muridæ and is peculiarly adapted to an aquatic life, although there are other species of the subfamily which are also amphibious. Its body is about 12 inches in length, and its tail about 8 inches. The body is rather stout and thickset, the head is rounded, and the ears are small and close. The front feet are rather small, with four digits and a rudimentary thumb, while the hind feet are stout, with five partially webbed toes, and so attached to the leg that they are well fitted for swimming, yet the sculling movement of the much compressed tail is the principal means of progress in the water. As with other aquatic mammals, the pelage consists of an undercoat of dense, soft fur and an outer coat, on the back and sides, chiefly of long, shining, smooth hairs. So much air is held by these outer hairs that in ordinary excursions the under fur is hardly wetted. The color above is dark umber brown, darkest on the middle of the back and on the tail, while beneath the prevailing shade is gray.

The musky odor from which the animal gets its name is due to the secretion of a large gland in the inguinal region, which is present in both sexes. The muskrat is omnivorous, eating roots (especially of the pond lily), fruits, vegetables,

insects, worms, mollusks, etc., but it is especially fond of apples, in search of which it often wanders far from its home, and thus finds its way occasionally into barns and cellars. In some localities fresh-water mussels are a favorite article of food, and large heaps of the empty shells are sometimes found near muskrat burrows, due to their preference for dining day after day in the same place. Although so widely distributed and abundant, the muskrat is not often seen, as it is mainly nocturnal in its habits and during the day remains in its burrow or house. The home of this animal is either built of sticks, mud, and grass and forms a heap the size and appearance of a small haycock, or else is dug out of the bank of a stream or pond and then forms a burrow of indefinite length, the entrance to which is under water. The character of the home seems to depend upon the nature of the country; where there is an extensive swamp or stretch of shallow water, so that the houses will not be ordinarily exposed to wandering enemies, muskrats seem to prefer these homes; but where they live in or about a narrow stream, with little swamp, the burrow in the bank is the more usual shelter. The houses are always entered from water deep enough so that the passageway shall not freeze up in winter.

The flesh of the muskrat is good eating and was formerly much used by the Indians. The fur is used quite extensively, so that the skins are an article of commerce. For this reason muskrats are extensively trapped, and hundreds of thousands are killed annually. Their numbers nevertheless do not decrease, partly because their natural enemies are fewer, but chiefly because of the fact that the making of slack-water spaces by damming rivers and the digging of canals (whose banks they seriously damage) have greatly extended waters suitable for them in various parts of the country. Trapping is done, chiefly in the winter, by setting small steel traps at the entrance to their houses or burrows or in runways where they come ashore.

The name "muskrat" is applied to a number of other more or less ratlike animals on account of their strong odor. In Europe it is frequently given to the desman (q.v.), while in India it is associated with a shrew (*Crocidura cærulea*) which has well-developed musk glands on the belly and flanks. In South Africa the genet (*Genetta felina*), a viverrine, carnivorous mammal, is sometimes so called.

Consult the works of Audubon, Richardson, Godman, Kennicott, and other early writers; and of C. C. Abbott, H. D. Thoreau, J. Burroughs, D. L. Sharp, R. Robinson, A. L. Adams, W. Cram, J. A. Allen, E. S. Mearns, and other recent naturalists; especially Butler, "Observations on the Muskrat," in *American Naturalist*, vol. xv (Philadelphia, 1885); Herrick, *Mammals of Minnesota* (Minneapolis, 1892); C. H. Merriam, *Mammals of the Adirondacks* (New York, 1895); Cram and Stone, *American Animals* (New York, 1902); E. T. Seton, *Life-Histories of Northern Animals* (ib., 1909); D. E. Lantz, "The Muskrat," in *United States Department of Agriculture, Farmers' Bulletin, No. 396* (Washington, 1910); N. Hollister, "Systematic Synopsis of the Muskrats," in *United States Biological Survey, North American Fauna, No. 32* (ib., 1911). See Plate of BEAVER, COYPU, AND MUSKRAT.

MUSK ROSE. See ROSE, and Plate of ROSES.

MUSK SHEEP. A musk ox (q.v.).

MUSK SHREW. One of a large group of Old World shrews, of which about 80 species of the genus *Crocidura* are known. They are noted for their musky odor, range from the Mediterranean to northern India, and are of terrestrial habits. One of these shrews (*Crocidura cærulea*) is the largest of its race (see SHREW) and as large as a rat. It is gray and is known to Anglo-Indians as the muskrat. It enters houses and at night runs about, catching insect vermin; but counterbalances this beneficial service by leaving behind a musky odor, sometimes unpleasantly strong.

MUSK TORTOISE, MUSK TURTLE, or STINKPOT. One of the mud or box turtles (*Cinosternum odoratum*) of the eastern half of the United States, well known for its strong, musky odor, which exudes from glands in the armpits. It has a disproportionately large head, a long and slender neck, with two yellow stripes on each side, and a dusky shell, clouded and sometimes spotted. It is edible.

MUSKWAKI, mŭsk-wä'kê. An Algonquian tribe. See FOX.

MUSLIM. See MOSLEM.

MUSLIM, mŭs'lĭm, IBN AL WALID AL ANSARI (c.747–803). An Arabic poet who became famous by his songs in honor of the Barmecides (q.v.) and Fadl ibn Sahl, in which he praised wine and love. His divan has been published by De Goeje (Leyden, 1875). Consult Carl Brockelmann, *Geschichte der arabischen Literatur* (Weimar, 1898), and R. A. Nicholson, *A Literary History of the Arabs* (New York, 1907).

MUS'LIN (Fr. *mousseline*, from It. *mussolino*, muslin, made of muslin, from *mussolo*, muslin, from ML. *Mossula*, from Syr. *Mosul*, a city of Mesopotamia on the Tigris, whence the fabric originally came). A cotton fabric of Oriental origin and now the term for goods marked by lightness and openness of texture. No such trade now exists in the Orient; and for muslins of the common kinds at least the Indian market depends upon the manufactures of England and France. Muslin is much less compact in its texture than calico—indeed, it more nearly resembles gauze in appearance; but it is woven plain, without any twisting of the filling threads with those of the warp. The manufacture of muslins is very extensive, especially printed muslins, in which the patterns are produced by the same processes as in calico printing. The term "muslin" is also applied to a coarser and heavier but plainly woven cotton cloth suitable for sheets and pillowcases. This is sold both bleached and unbleached and comes 36 inches wide. See WEAVING.

MÜSLIN, mus-lēn', WOLFGANG. See MUSCULUS, WOLFGANG.

MUS'PRATT, JAMES SHERIDAN (1821–71). An Irish chemist, the son of James Muspratt, a well-known chemical manufacturer. He studied under Liebig, at Giessen, 1843–45, and there took the degree of doctor of philosophy, with a thesis tracing the resemblance between the carbonates and sulphites. In 1847 he produced a number of interesting organic substances from the sulphocyanates of ethyl and methyl. On his return to England in 1848 he established and became superintendent of a college of chemistry at Liverpool. From 1854 to 1860 he was engaged on his well-known dictionary of chemistry. The latest German edition of this important work may be found mentioned in the biblio-

graphic section of the article CHEMISTRY. His *Outlines of Quantitative Analysis for Students* has had a considerable circulation.

MUS'QUASH. The name among the Indians of the Canadian Northwest for the muskrat (q.v.). "Talking musquash" is a phrase in the Hudson Bay region for the gossip of trappers or fur traders about peltries, of which the fur of the muskrat forms a constant and important item.

MUSSAFIA, mụs-sä'fê-à, ADOLF (1835–1905). An Austrian Romance philologist, born at Spalato. He studied medicine, but in 1855 became instructor in Italian at the University of Vienna and in 1867 professor of Romance philology in the same institution. He contributed valuable papers on Italian dialects to the proceedings of the Vienna Academy and wrote: *Altfranzösische Gedichte aus venezianischen Handschriften* (1864); an edition of Fra Paolino's *De Regimine Rectoris* (1868); *Handschriftliche Studien* (1862–70); *Beiträge zur Kunde der norditalischen Mundarten im 15. Jahrhundert* (1873); *Die catalanische Version der sieben weisen Meister* (1876); *Italienische Sprachlehre in Regeln und Beispielen* (27th ed., 1904); and studies of the legends of the Madonna (1884–91). A complete bibliography of his productions may be found in the *Festgabe* presented to him shortly before his death in 1905.

MUSSCHENBROEK, mụs'ken-bruk, PIETER VAN (1692–1761). A Dutch physicist. He was born at Leyden, where he studied medicine, physics, and mathematics at the university, graduating in 1715. He then went to London, where he met Newton. He was appointed professor of physics and mathematics at the University of Duisburg in 1719 and at Utrecht in 1723; and in 1739 he became professor of mathematics at Leyden. His publications include: *Epitome Elementorum Physico-Mathematicorum* (1726), a work that passed through several editions; *Elementa physica* (1729); *Physicæ Experimentales et Geometricæ Dissertationes* (1729); *Introductio ad Philosophiam Naturalem* (2 vols., 1762).

MUS'SEL (AS. *muxle, mucxle,* from Lat. *musculus,* small fish, sea mussel, dim. of *mus,* mouse). The word "mussel" is one of those popular names of such uncertain limits that to attempt to define it is a difficult matter. At the present time it is applied to two totally distinct groups of bivalved mollusks, one marine and the other fresh-water. The first group includes the shellfish of the family Mytilidæ, especially the genera *Mytilus, Modiola,* and *Modiolaria.* This family is characterized by the presence of a well-developed byssus, two abductor muscles, a fringed vestige of a siphon, and an equivalve but inequilateral shell, with a thick epidermis, but with a weak and usually toothless hinge. The common mussel (*Mytilus edulis*) of all northern coasts is in the Old World much raised for food, but its greatest importance in the United States lies in its usefulness as bait for fishermen and as manure for farmers near the coast. It is gregarious and occurs in masses, closely crowded together, adhering to rocks, sand, and each other, by the very tough byssus, the whole beds being thus practically spun together. These beds are generally in shallow water, less than 30 fathoms, and are often exposed at low tide. The shell is oblong with a terminal umbone, and generally about 3 inches long by 1½ inches wide; but under favorable conditions they may become 6 inches or even more in length. The outside of the shell is black, but inside it is pearly blue. When young, mussels move about, but they soon

AMERICAN MARINE MUSSELS.

a, common edible mussel (*Mytilus edulis*); *b,* horse or meadow mussel (*Modiola modiolus*); *c,* ribbed mussel (*Modiola plicatula*).

anchor themselves by the byssus, and unless artificially disturbed will remain fixed throughout life. So strong are the byssus threads that these mollusks have been utilized as an aid in the strengthening of breakwaters, the young mussels being planted on the rocks in myriads and thus assisting in uniting the separate pieces into a rigid whole. The horse mussels belong to the genus *Modiola,* which does not have the umbone terminal. They are more elongated than *Mytilus* and some species reach a much larger size. See Colored Plate of CLAMS AND EDIBLE MUSSELS.

The other group to which the name "mussel" is given is the family Unionidæ, which are fresh-water mollusks of very wide distribution. The family is characterized by the possession of two adductor muscles and regular shells, with thick epidermis and thin nacreous layer, prominent external ligament, and a variable hinge. Upward of 1000 species have been named, a very large proportion of which occur in the United States, where the family is very abundant and widely distributed. It is still an open question as to what constitutes a valid species or even a genus in this family, though several genera, as *Unio, Anodon,* and *Margaritana,* are recognized. These fresh-water mussels occur in lakes, ponds, and streams, generally in large numbers together, and are sometimes 8 inches or more in length, by 4 inches in breadth, but they are usually smaller and narrower. They are sometimes used for food, but are tough and not very palatable. Their chief importance lies in the fact that they frequently produce pearls, and are indeed the only basis of the fresh-water pearl industry. As high as $25,000 has been paid for a single mussel pearl. (See PEARL.) All of the Unionidæ have a remarkable life history, for the eggs when laid find their way into the mother's gills, where they remain until the young are hatched. Although these young have a bivalve shell, they are totally different from the adults and have a very simple structure. At this stage of development they are called glochidia larvæ. After leaving the maternal gills they attach themselves to the skin of a fish, where they give rise to an excrescence which gradually swells until it is a capsule big enough to see with the naked eye. These capsules are almost black and are usually seen on or near the fins of the host fish; they are often very numerous on a single fish. Within the capsule the glochidium lives until it finally

assumes the adult form, when it breaks through the outer wall of the capsule and settles to the bottom as a miniature mussel. The distribution of the species is therefore mainly dependent on the activity of the fishes which serve as hosts.

Fossil mussels are found in most geological formations from those of Ordovician age to those of recent time. They comprise the superfamily Mytilacea, containing the families Modiolopsidæ, Mytilidæ, and Dreissensiidæ. The first, now entirely extinct, are essentially ancestral forms of the Mytilidæ, which range through Devonian to recent formations. The Paleozoic species of this family belong mostly to the genus *Modiola*, which began in Devonian, was abundant in Jurassic and Tertiary time, and still persists as a common shell of the littoral zone of all seas. *Mytilus* began in the Triassic. *Lithophagus* or *Lithodomus*, the mussel which bores cavities in limestone rock, has been recognized in Mesozoic and Tertiary formations. The Dreissensiidæ are of later origin, appearing first in the Tertiary. They are essentially freshwater and estuarine mussels, and have probably evolved from *Mytilus* or a closely allied genus of the littoral zone in late Mesozoic or early Tertiary time. Consult: A. F. Arnold, *Sea-Beach at Ebb-Tide* (New York, 1903); A. G. Mayer, *Sea-Shore Life* (ib., 1905); Lefevre and Curtis, "Studies in the Production and Artificial Propagation of Fresh-Water Mussels," in *United States Fisheries Bureau, Bulletin*, vol. xxx (Washington, 1912), and other publications of this Bureau. See Plate of ABALONE, ETC., and illustration under MOLLUSK.

MUSSELBURGH, mŭs'sel-bŭr-ô. A small seaport town and parliamentary burgh in the County of Edinburgh, Scotland, at the mouth of the Esk, 6 miles east of Edinburgh (Map: Scotland, E 4). Tanning, leather dressing, and the manufacture of sailcloths, nets, paper, wire, oil, and salt are carried on. The surrounding land has coalpits, and is much cultivated by market gardeners. The harbor at Fisherrow is frequented by coasting craft and by small vessels from Holland and the Baltic. There are famous golf links here. Pop., 1901, 11,711; 1911, 15,938.

MUSSEL DIGGER. A popular name for the California gray whale.

MUSSEL PICKER. See OYSTER CATCHER.

MUSSEL POISONING. A severe form of poisoning which arises from eating stale or decomposed mussels or those which have become toxic from their surroundings. The liver of certain mussels contains a substance called mytilotoxin, a very active poison to man. The symptoms of mussel poisoning are profound general nervous depression, with violent gastrointestinal irritation, and resemble closely those of ptomaine poisoning. Decomposed fish, stale oysters, and certain salted fish, such as the sturgeon of Russia, give rise to identical symptoms. The treatment is promptly to rid the gastrointestinal canal of its contents, to relieve the pain by morphine and warm cataplasms, and to stimulate the patient with brandy, champagne, strychnine, or similar quickly acting drugs. See PTOMAINE POISONING.

MUSSEL SCALE. A diaspine scale insect of the genus *Mytilaspis*, all of the species of which bear scales shaped like a mussel shell or the shell of an oyster. Several species are very injurious to vegetation. The so-called oyster-shell barklouse of the apple (*Mytilaspis pomorum*) is a cosmopolitan enemy of apples and pears, and the long scale and the purple scale of the orange are pernicious examples.

MUSSET, mụ'sâ', ALFRED DE (1810–57). A noted French poet, dramatist, and novelist, born in Paris, Nov. 11, 1810. His father was a man of letters, and Alfred grew up in a literary atmosphere, was graduated with honors at the Collège Henri Quatre, and published at 20 his first verses, *Contes d'Espagne et d'Italie* (1830). This, with *Poésies diverses* (1831) and *Le spectacle dans un fauteuil* (1832), established his fame. The latter contained a poem, *Namouna*, and two short plays in a manner peculiarly his own, *La coupe et les lèvres* and *A quoi rêvent les jeunes filles*. He had already produced on the stage a comedy, *La nuit vénitienne* (1830), a failure. In 1833 he followed the dramatic vein in two tragi-comedies, *André del Sarto* and *Les caprices de Marianne*, possibly his best. *Rolla*, too, belongs to this year, and was once thought the French *Childe Harold*, though now less admired. This sudden flowering of Musset's genius was interrupted by a reckless passion for George Sand (q.v.), whom he first met in the summer of 1833 and accompanied in 1834 to Italy as her secretary. He suffered acutely in this new relation from disillusionment and self-deception. He "was a child all his life and a spoiled child," never more so than in the inevitable estrangement (1835) that cost George Sand few pangs, but marks a cardinal point in Musset's career. He returned sick, experienced another unhappy love and a series of sordid entanglements, and worked intensely and admirably, at intervals interspersed with periods of depression. Through the patronage of the Duc d'Orléans he received a position as librarian in 1838.

Musset's work after the separation from George Sand (*Les nuits, Souvenir, Lettre à Lamartine, Espoir en Dieu*) shows at its best a sad, yet in the main sober, resignation. But during this period he was more occupied with drama and with prose fiction. Of the *Comédies et proverbes, Fantasio* and *On ne badine pas avec l'amour* belong to 1834, *Le chandelier* to 1835, *Il ne faut jurer de rien* to 1836. *Lorenzaccio*, an historical drama (1834), had no success. These, as Lemaître points out in his preface to Jouaust's *Théâtre d'Alfred de Musset*, show the most genuine and original dramatic talent of all the Romantic school. Tragedy mingles here with comedy, not as with Hugo by juxtaposition, but by interpenetration, for Musset had too true a taste to yield to the extravagances of Dumas or Hugo. In an essay *La tragédie* (1838) he refuses allegiance alike to French romantic and classic principles, but he combines the outward appearance of restraint with the new liberty to associate the weird and terrible in human life with its higher comic aspects. Thus he succeeded in presenting complex characters better than any of his contemporaries or predecessors in French drama. His wit in dialogue had not been equaled since Beaumarchais. None of these plays was acted in France before 1848, and their influence is hardly noticeable before 1865, but they contain the quintessence of romantic imaginative art. They show most and best the unchecked freedom of fancy that joined with the spirit of realistic comedy in Ponsard, Dumas, and Augier to produce the modern French drama. Musset's prose fiction begins with *Les confessions d'un enfant du siècle* (1836), which in spirit at least is

autobiographic. This was followed by nine *Contes* (1837–44), of which *Croisilles* is best, and a tenth, *La mouche* (1851), one of the last flickerings of his genius. These are interesting chiefly in exhibiting the progress of ethical disintegration. *Margot* and *Le merle blanc* have autobiographic elements. So perhaps has *Mimi Pinson*, a "profil de grisette" (1845). In this story Musset anticipates by some six years a type of the French working girl portrayed by Henri Murger. Mimi has few clothes, but she looks as tidy as she can, and has the pretty manners, the recklessness as to the future, and the easy morality of the *grisette*. Musset's critical essays are also worthy of remark, especially the witty *Lettres de Dupuis et Cotonet*, satirizing modern marriage, journalists, novelists, and, above all, the critics of thoroughbred romanticism. Musset's closing years were marked by dejection and by comparative inactivity. In 1841 he flung at the Germans his fiery war song, *Le Rhin allemand*. In 1845 appeared *Il faut qu'une porte soit ouverte ou fermée*, a *proverbe*. In 1847 *Un caprice* (1837), a little tragedy with a chorus to utter platitudes in Greek style, was performed at the Théâtre Français. Between 1848 and 1851 *Bettine* was played and *Carmosine* was written, but they are scarcely worthy of their author.

Musset died of an affection of the heart, May 2, 1857. His works were published in 10 volumes in 1865.

Bibliography. F. T. Palgrave, in *Oxford Essays* (Oxford, 1855); George Sand, *Elle et lui* (Paris, 1859); Paul de Musset, *Lui et elle* (ib., 1860); Spoelbergh de Lovenjoul, *Etude critique et bibliographique sur les œuvres d'Alfred de Musset* (ib., 1867); Paul de Musset, *Biographie d'Alfred de Musset* (2d ed., ib., 1877); P. Lindau, *Alfred de Musset* (Berlin, 1877); Jaubert, *Souvenirs* (ib., 1881); Jules Lemaître, *Introduction au théâtre de Musset* (ib., 1885–89); Faguet, *Etudes littéraires sur le XIXème siècle* (ib., 1887); Edward Dowden, "On Some French Writers of Verse," in *Studies in Literature* (5th ed., London, 1889); C. A. Sainte-Beuve, in *Portraits Contemporains* (new ed., Paris, 1889–91); Arvède Barine, pseudonym of Madame Vincens, *Alfred de Musset* (ib., 1893; Eng. trans. by C. C. Hayden, New York, 1906); L. Séché, *Alfred de Musset* (Paris, 1907); C. A. Sainte-Beuve, *Causeries du lundi*, English translation by E. J. Trechmann (New York, 1909–11); M. C. Donnay, *Alfred de Musset* (Paris, 1914).

MUSSOLINI, mus'sō-lī'nĭ, BENITO (1883–). Italian prime minister and leader of the Fascisti. He was born at Dovia in the province of Forli; interested himself in politics at an early age, inclining toward the radical side; traveled widely throughout Europe, and lived for a time in Switzerland where his imprudence in the expression of extreme ideas led to his expulsion. Later he went to Trentino, where he was active among Irredentists against the Austrian rule. In 1912 he was arrested for opposition to the government's war policy. In 1914 he was engaged in a revolutionary movement in the Romagna and Tuscany, which resulted in the outbreaks of May and June of that year. During the war he abandoned Socialism and pursued a strictly nationalist and patriotic policy, founding the *Popolo di Italia*, which fought against neutrality. He saw active service in the war and was wounded. After his return to civil life he began a campaign against Bolshevism and the organization of the famous Fascisti, which in 1922 became the chief power within the Italian state. On the demonstration of the Fascisti's ability to carry out the threats of their leaders to seize the government if their demands were not met, the authorities gave way, and Mussolini was chosen prime minister October 30th. Parliament conferred complete power on the government for the execution of its policies. Although his early addresses showed that he fully realized his power, Mussolini during the first three months of his administration showed a conciliatory spirit, but later the extremist element among the Fascisti appeared to dictate the government's course, which became more uncompromising.

MUSSORGSKY, mŭs-sōrg'skĕ, MODEST PETROVITCH (1835–81). A Russian composer, born at Karev in the Government of Pskov, March 28, 1835. His earliest instruction on the piano was from his mother, and his progress was so rapid that at the age of 10 he was a performer of no mean ability. When he entered the Military Academy at St. Petersburg, he continued to study the piano with Gerke, but without thought of taking up music as a profession. After graduation he entered one of the crack regiments of the Russian army. In 1857 he made the acquaintance of Dargomyzhki (q.v.), who introduced him to the leaders of the younger national school. Among these it was Balakirev (q.v.) who recognized Mussorgski's unusual dramatic talent. Although he did not give him regular instruction, he supervised in a general way the younger man's study of Beethoven, Schumann, and Glinka. It is much to be regretted that throughout his career Mussorgski was handicapped by his inadequate technical equipment. Resigning his military commission to devote his whole energy to composition, for some years he struggled against poverty. Recognition did not come, and in 1863 he accepted an uncongenial post under the government, which circumstances compelled him to hold till his death. An opera, *Salammbô*, he did not complete, but used much of the music later in *Boris Godunov*. For a time he cultivated the song, producing masterpieces which to this day are unsurpassed and scarcely rivaled by the work of any Russian composer. The two next attempts at opera, *The Match-Maker* and *The Fair at Sorochinsi*, remained fragments. In 1868 he began *Boris Godunov*, a typical national subject treated with wonderful dramatic power. It was completed two years later, but not produced until 1874, after considerable changes had been made. In 1896 it was performed, revised, and completely reorchestrated by Rimski-Korsakov (q.v.), and in this form has become a fixture in the repertory of all Russian opera houses. From 1872 to 1880 Mussorgski worked intermittently on his second completed opera, *Khovanstchina*, also revised by Rimski-Korsakov. He died in St. Petersburg on his forty-second birthday. The list of his works is completed by the enumeration of the orchestral compositions *Intermezzo in modo classico*, *Scherzo*, a fantasie, *A Night on the Bare Mountain*, and *Turkish March;* the choral works *The Defeat of Sennacherib* and *Joshua Navin;* and a suite for the piano, *Pictures from an Exhibition*.

MUS'SULMAN. See MOSLEM.

MUSTAGH (mōō-stäg') **MOUNTAINS.** A

mountain range in Kashmir. See KARAKORAM MOUNTAINS.

MUS'TANG. See Plate of EQUIDÆ.

MUSTAPHA, mus'tä-fä. The name of four Ottoman sultans.—The first (1591–1639), a feeble-minded son of Mohammed III, succeeded Achmet I in 1617, was deposed after three months, came to the throne again in 1622, and was again deposed (1623).—MUSTAPHA II (1664–1704) came to the throne in 1695, and at the Peace of Carlowitz signed away the Morea, the Ukraine, Hungary between the Danube and Theiss, and Azov. He was deposed by a rising of the Janizaries in 1703.—MUSTAPHA III (1717–73) ruled from 1757 until his death. He quarreled with Russia and Poland and involved the country in war which lasted through his reign. His internal reforms were no more successful than his foreign policy.—MUSTAPHA IV (1779–1808) was made Sultan by the Janizaries, who rebelled against Selim III in 1807, and was deposed and killed in the next year.

MUSTAPHA, KARA, kä'rà. A Turkish grand vizier. See KARA MUSTAPHA.

MUSTAPHA FAHMY PASHA (?–1914). An Egyptian statesman. When the English went into Egypt, he immediately entered into close relations with them. He succeeded Riaz Pasha as Premier of Egypt in 1891, but was summarily dismissed in 1893 by the new Khedive, Abbas Hilmi, as being too friendly to the English. Two years later he again became Premier, and held that office until November, 1908. Throughout his term of office he coöperated with Lord Cromer (q.v.) in the governing of Egypt. In 1914 he was appointed president of the council of ministers.

MUSTAPHA RESHID PASHA (1800–58). A Turkish statesman, born at Constantinople. He served as Ambassador at Paris (1834–36, 1841–43, 1843–45) and at London (1836–37, 1838–41), as Minister of Foreign Affairs (1837–38), and as Vali of Adrianople (1843). During 1845–57 he was six times Grand Vizier, and in that capacity championed reform measures. The skillful part he played in connection with the Egyptian question in 1840 and at the time of the Crimean War brought him European recognition. He was largely responsible for the remodeled Tanzimat, or Turkish administrative code.

MUS'TARD (OF. *moustarde*, Fr. *moutarde*, from OF. *moust*, from Lat. *mustum*, must, neut. of *mustus*, fresh), *Brassica*. A genus of plants of the family Cruciferæ, having yellow flowers and linear or oblong pods, which terminate in a sword-shaped, compressed, or four-cornered beak and contain one row of seeds. The black mustard (*Brassica nigra*) is an annual, which grows wild in fields and by waysides in the middle and south of Europe. Its pods are bluntly four-angled, smooth, erect, and lie close to the stem, their valves one-nerved; the leaves are smooth, the lower ones lyrate, the upper linear-lanceolate; the seeds are brownish black. White mustard (*Brassica alba*), also a native of most parts of Europe, is an annual having divergent pods covered with stiff hairs, the valves five-nerved, the seeds yellowish, the leaves pinnatifid. Both these species are cultivated in Europe and to a limited extent in America, for their seeds, which are ground into powder to make the well-known condiment called mustard. The mustard of commerce is frequently mixed with flour and colored with turmeric. The powder of the seeds is also much used in medicine as a rubefacient. Mustard seeds depend for their pungency on the volatile oil of mustard. There is also in the seeds a bland fixed oil, oil of mustard, which is obtained from them by expression, and constitutes about 28 per cent of their weight. White mustard is often sown in gardens and forced in hothouses for use as a salad, and is also sometimes sown as a green manure crop and for feeding sheep, when turnip or rape has failed. Wild mustard, or charlock (*Brassica arvensis*), which is distinguished by turgid and knotty pods with many angles and longer than the two-edged beak, is a troublesome annual weed in both Europe and America. It may be controlled by spraying with a 2 per cent solution of copper sulphate or 12 to 15 per cent iron sulphate at the rate of 50 to 70 gallons per acre. (See HERBICIDE.) Indian mustard (*Brassica ramosa*) is extensively cultivated in India for its seeds, which are used as a condiment, as are those of *Brassica dichotoma* and *Brassica glauca* (regarded by some botanists as forms of *Brassica arvensis*), also cultivated in India. Other species are curled mustard, *Brassica japonica*, used to a considerable extent in the United States for greens; a turnip-rooted Chinese form (*Brassica napiformis*), and Chinese mustard (*Brassica juncea*). Hedge mustard, *Sisymbrium officinale*, tumble mustard, *Sisymbrium altissimum*, hare's-ear mustard, *Conringia orientalis*, and garlic mustard, *Alliaria officinalis*, are introduced species, becoming troublesome weeds in many parts of the United States. See illustration of CABBAGE AND ALLIES.

MUSTARD FAMILY. A family of plants. See CRUCIFERÆ.

MUSTARD OIL, or OIL OF MUSTARD, chemically known as allyl isothiocyanate, C_3H_5NCS. A volatile oil obtained from black mustard, the seeds of the *Brassica nigra*, growing in Asia and in southern Europe. The seeds contain a bland fixed oil which may be removed by expression, but they do not contain the volatile oil ready-formed. The latter is produced by the action of a soluble ferment (myrosin) upon the potassium salt of myronic acid (a glucoside) in the presence of water. Both myrosin and potassium myronate are contained in black mustard seeds. If, therefore, after the fixed oil has been removed, the crushed seeds are treated with water and distilled, the volatile oil is obtained, in much the same way as the volatile oil of almonds is obtained from bitter almonds. (See BENZALDEHYDE.) Mustard oil is a very volatile colorless liquid, having a painfully pungent odor and an acrid taste; when applied to the skin it speedily raises blisters; it is insoluble in water and, if pure, boils at 151° C. Its formation from potassium myronate takes place according to the following chemical equation:

$$\underset{\text{Potassium myronate}}{KC_{10}H_{18}NS_2O_{10}} = \underset{\text{Mustard oil}}{C_3H_5NCS} + \underset{\text{Glucose}}{C_6H_{12}O_6} + \underset{\text{Acid potassium sulphate}}{KHSO_4}$$

The pungency of ordinary mustard as a condiment is due to the formation of the volatile oil on addition of water. The allyl isothiocyanate prepared by an artificial process in the chemical laboratory is identical with the volatile oil obtained from mustard seeds.

The term "mustard oils" is often applied to organic isothiocyanates in general.

MUSTEL'IDÆ (Neo-Lat. nom. pl., from Lat. *mustela*, weasel, from *mus*, mouse). The family of small carnivores, represented by the weasel and embracing the more highly valued fur-bearing animals. They are related to the arctoid Carnivora, especially the bears, and the family includes three groups, as follows: (1) Melinæ (the Old World badgers); (2) Mustelinæ (grison, marten, sable, wolverine, polecat, weasels, ratel, American badger, and skunks); (3) Lutrinæ (otters). Consult authorities cited under MAMMALIA, especially Beddard. See FUR-BEARING ANIMALS.

MUS'TER (from OF. *mostre*, *monstre*, Fr. *montre*, show, from Lat. *monstrare*, to show, from *monstrum*, portent, monster, from *monere*, to warn). When used in its military sense, this term applies particularly to the assembling of troops for the verification of membership. In the United States the troops are mustered for pay on the last day of each month, each stated muster being preceded by a minute inspection. In the British army there is a special muster parade once each year, when every individual of each command must respond in person to the regimental muster roll. In the United States navy the crew is mustered or assembled at least once (usually two or three times) a day for drill, for instruction, or to ascertain if all are on board. Once a week, on Saturday morning, the crew is mustered and inspected by the commanding officer. It was formerly the practice to have general muster once a month on the first Sunday of each month. General muster is now held less often, on account of the size of the crews of large ships, and usually takes place on Saturdays. The presence of the officers is ascertained by inspection; but the names of the crew are called by the paymaster or his clerk, and each man in turn, except petty officers, as his name is reached, passes across the deck in front of the captain. It was formerly the custom to muster the crew aft and read the Articles for the Better Government of the Navy and then call the muster roll of the crew. The two performances now take place on different days, and on very large ships the Articles for the Better Government of the Navy are read by the divisional officers to their divisions.

MUSU. See MOXOS.

MUSURUS, mōō'sụ-rŭs, MARCUS (c.1470–1517). A Greek scholar, born at Retimo in Crete. He was a pupil of Andreas Johannes Lascaris at Venice. In 1505–09 he was professor of Greek at Padua, and from 1509 onward he held a like professorship at Venice. From 1493 he was associated with Aldus Manutius (q.v.), the printer, and supervised, among other things, the first edition of the scholia of Aristophanes (1498), of Athenæus (1514), Hesychius (1514), and Pausanias (1516). Consult J. E. Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

MÛT, mōōt. An Egyptian goddess, the wife of Ammon (q.v.) of Thebes and the mother of Chons (q.v.). Her name signifies "mother," and in the inscriptions she is entitled "the lady of heaven, the queen of the earth." The chief temple of the goddess was at Karnak; it was connected with the great temple of Ammon by a long avenue of sphinxes and was partly surrounded by the sacred lake Asher. From the latter circumstance Mût is often called "the lady of Asher." She is frequently represented as a lion-headed goddess wearing upon her head the solar disk, but in mural decorations she is more commonly depicted in human form wearing the vulture headdress and other symbols of a queen of Egypt. In the period from Amenhotep IV to Akhen Aton (1375–1350 B.C.) she shared in the persecution set on foot against Ammon and his family. Consult: K. A. Wiedemann, *Religion of the Ancient Egyptians* (New York, 1897); Benson and Gourlay, *The Temple of Mût in Asher* (London, 1898); Georg Steindorff, *The Religion of the Ancient Egyptians* (New York, 1905); Mallon, in Joseph Huby, *Christus: Manual d'histoire des religions* (Paris, 1912), containing a bibliography.

MUTANABBI, mōō'tä-nä'bē (Ar. *Abu'l Tayyib Aḥmad ibn al Husain al Mutanabbi*) (905–965). One of the most noted of the Arabic poets of the period of decline. He was born in Syria, the son of a water carrier, and spent several years in the desert *al Samāwa* (Mesopotamia). He was not a fervid Moslem and at one time even put himself forward as a prophet (whence his name Mutanabbi, the one claiming to be a prophet). He was taken prisoner by Lulu, the Ikhshid Emir of Emesa. After being set at liberty he lived in great poverty and neglect, but in 948 became attached to the court of Saif al Daula at Aleppo, whom he accompanied on his raids and whose praises he sang. He left Saif al Daula in 957, going over to his enemy the Ikhshid Kafur of Egypt. In 961 he went to Bagdad and at last to Shiraz, where the Buwayid Adud al Daula became his patron. He was murdered in 965 on the road from Shiraz to Kufa. His *Diwān*, containing 289 poems, has been very widely read in the East, where he is considered the last great Arabic poet, perhaps because of his intense national feeling. No less than 40 commentaries have been written on his *Diwān*. Mutanabbi is the type of the court singer, his theme the battle and the heroic deeds of his patrons. His songs lack the fire of the earlier Bedouin poetry and are artificial, but their technical excellence cannot be denied. They have been edited by Dieterici, with the commentary of *al-Wāḥidī* (Berlin, 1861), and published at Bulak (1860) and Cairo (1870, 1890) with that of *al-'Ukbarī*. Other editions are: Calcutta (1815), Beirut (1860), Bombay (1892). The *Diwān* has been completely translated by Hammer-Purgstall, *Motenebbi der grösste arabische Dichter* (Vienna, 1824); extracts may be found in Rückert's *Hamasa* (Stuttgart, 1846) and in Ouseley, *The Oriental Collection*, vol. i (London, 1797).

Bibliography. Peter von Bohlen, *Commentatio de Mutanabbio* (Bonn, 1824); F. H. Dieterici, *Mutanabbi und Seifuddaula* (Leipzig, 1847); August Müller, *Der Islam in Morgen und Abendland*, vol. i (Berlin, 1885); Carl Brockelmann, *Geschichte der arabischen Literatur*, vol. i (Weimar, 1898); R. A. Nicholson, *A Literary History of the Arabs* (New York, 1907); C. I. Huart, *Histoire des Arabs* (Paris, 1912).

MUTA-NZIGE, mōō'tä-n'zē'gā. See LAKE EDWARD.

MU'TASE. See ENZYME.

MUTATION, mū-tā'shŭn (Lat. *mutatio*, change, from *mutare*, to change, for *movitare*, frequentative of *movere*, to move, Skt. *mīv*, to push). The hypothesis that evolution (q.v.) takes place by means of sudden changes rather than through slow and almost imperceptible

transformations. This idea, though not new, was called into great prominence by the publication in 1901 of *Die Mutationstheorie* by Prof. Hugo de Vries, professor of botany at Amsterdam. Darwin himself, especially in his earlier works, recognized that "single variations" or sports are to be reckoned with as well as natural selection. Through the influence of Wallace and others natural selection had come to be the ruling theory, and it is only in recent years that the significance of sports in evolution has had much place. However, as long ago as 1864 Kölliker made an appeal for heterogenesis (which is identical with the mutation of De Vries) as a factor in the evolution of species. Professor Scott, of Princeton, has used the word "mutation" for gradual modifications. Still other writers have referred to the sudden origin of species as saltatory evolution. But De Vries is the first author who has performed experiments and worked out a theory to fit the facts which they have yielded.

Before taking up the experiments it may be said that mutation involves no necessary abandonment of natural selection, except in so far as it may have been held to account for the actual origination of new characters. Darwin recognized that natural selection improves but cannot originate anything new; mutation, on the other hand, is a means for the development of new characters and even a new assemblage of characters, i.e., a new species. It should be stated, however, that De Vries gives but little place to natural selection, even as a means of improving something already present. His experiments show that there is a definite and rather narrow limit to individual variation, and the full advantage of artificial selection along any given line can usually be obtained within a few generations, as in the parsnip or carrot. He claims also that natural selection never fixes a character, but that reversion to the original may occur after many generations. Mutation, on the other hand, is believed to bring into existence something wholly new, without any transitions or connecting links. The new form, i.e., the mutant, remains fixed from the outset, and, if it is fit, it will remain as a new species.

In 1886 De Vries observed a colony of evening primrose (*Œnothera lamarckiana*) in which were two forms differing strikingly from the common type. Feeling that these aberrant forms doubtless came from the same parentage as the more common forms, he made artificial cultures to see if further aberrant forms would develop. He found such to be the case to an astonishing degree. Out of 50,000 seedlings of *Œnothera lamarckiana* in the various years of study, 800, or about 1.5 per cent, were mutants, while 98.5 per cent came true to seed. More than one-fourth of the 800 mutants were of one type, which De Vries named *Œnothera lata*, i.e., this form appeared anew in cultures more than 200 times. A form which he called *Œnothera gigas* appeared but once. When cultures are made from these new forms, they are found to come true to seed except for occasional mutations; nor was any tendency to reversion observed. To these new forms, as to the two aberrant types observed in 1886, De Vries has given names which imply that these forms are actually new species. They have, he says, all the characteristics of species, differing not in one, but in several, characters and remaining constant in all cultures. He shows that they are as much entitled to be considered separate species as are the various members of the natural group to which the parent *Œnothera lamarckiana* belongs. Indeed, it is possible to identify most of the new species even while yet seedlings. There are no transitions between parent and offspring or between one new species and another. There is no slow and gradual fixation of characters by natural selection, but the new species is complete from the outset. Most of these new forms would doubtless disappear in a natural state, for they would be obliged to engage in a keen struggle with species already present or would gradually suffer the loss of their specific characters through hybridization. However, some new species, especially if stronger than the parent form, might survive and extend their area; the two aberrant types first observed in a field in 1886 are still to be seen there and in greater numbers. Thus, it may be said that De Vries has seen the birth of new species, a phenomenon which all evolutionists have wished to see.

It is of interest to observe that, independently and almost simultaneously with De Vries, Korschinsky brought together a vast mass of data under the title "Heterogenesis and Evolution." From the records of gardeners and horticulturists he concluded that most cultivated varieties of plants have arisen suddenly as sports, i.e., through heterogenesis or mutation.

A large amount of experimental work has been stimulated by the mutation theory, so that the literature has become extensive, including also the cytological features of mutants. The chief objection urged against the theory is the claim that *O. lamarckiana* is a hybrid mixture, and that mutants are simply the products of a splitting hybrid which do not follow the Mendelian ratio. Much experimental work has been done, especially by Davis, in attempting to prove this claim, the difficulty of the proof lying chiefly in the fact that *O. lamarckiana* has disappeared as a wild plant and is known only as an introduced plant and in cultivation. Recently De Vries has shown that *O. biennis*, a species concerning whose purity no doubt has been expressed, is mutating almost as freely as *O. lamarckiana* and in the same directions. Bartlett also has discovered recently wild species of *Œnothera* from Kentucky that are mutating with remarkable freedom.

Bibliography. S. Korschinsky, *Tentamen Florœ Rossicœ Orientalis* (Leipzig, 1901); Hugo de Vries, *Plant Breeding* (Chicago, 1907); id., *Mutation Theory*, translated from the German by Farmer and Darbishire (2 vols., ib., 1909–10); R. H. Lock, *Recent Progress in the Study of Variation, Heredity, and Evolution* (new ed., New York, 1910); J. M. Coulter, *Fundamentals of Plant-Breeding* (ib., 1914); Bailey and Gilbert, *Plant-Breeding* (ib., 1915). The present status of the mutation theory, as presented by De Vries, together with a summary of the recent experimental work, may be found in the *Botanical Gazette*, vol. lix (Chicago, March, 1915). See Biology.

MUTA'TION. See Umlaut.

MUTATION STOPS. See Organ, *The Stops*.

MUTATION THEORY. See Mutation.

MUTAZ'ILITES (Ar. *Mu'tazilah*, from *'azala*, to separate). A Mohammedan sect founded by Wasil ibn Ata (c.745) and his disciple Abu'l Hudhail al Allaf (died c.845). They had rationalistic tendencies, illustrated, e.g., by the

teaching of Abu'l Hudhail that man knows right and wrong by reason, independent of supernatural revelation. Later teachers developed several subdivisions of the sect. See MOHAMMEDAN SECTS.

MUTE (from Lat. *mutus*, dumb; connected with Skt. *mūka*, dumb). A small instrument used to modify the sound of any of the string instruments. It is made of hard wood, ivory, or brass, and is attached to the bridge by means of a slit, a leg of it being interjected between every two strings. The use of the mute both softens the tone and imparts to it a peculiar muffled and tremulous quality, which is sometimes very effective. It is much used in dramatic music to give color in dreamlike or mystic situations. Its application is indicated by the letters *c. s.* or *con sordini*, and its discontinuance by *s. s.* or *senza sordini*. Mutes for brass instruments are wooden cones with a hole bored through them to allow the passage of the air. They are inserted into the bell of the instrument. But, as their insertion affects the pitch of the instrument, these mutes must be used with the utmost care. Recently attempts have been made to construct complicated mutes for brass instruments that shall not affect the pitch. In the case of horns and trumpets the left hand is used as a mute. Mutes are also used for drums. On snare drums a piece of cloth or felt is inserted on the lower side between the membrane and the snares. Kettledrums are covered with a cloth or the membrane is lightly touched with the left hand. On the piano the soft pedal is frequently called mute.

MUTES. A term applied in phonetics (q.v.) to articulate sounds, also called occlusives, plosives, or stop sounds, produced by a momentary narrowing or closure, followed by a reopening of some portion of the oral passage. Phonetically speaking, every mute or stop sound consists of three parts, the closing and the opening of the passage and the pause between. If this interval is noticeable to the ear, the consonant is then called double. The mutes are furthermore either voiced (sonant, breathed) if the breath stream makes the glottal chords vibrate, or voiceless (surd, unbreathed) if the glottal chords are at rest, as *b, p; d, t; f, v.* All of the mutes can, however, be formed with a whisper. If the closure is produced in the mouth, after which the breath bursts through the obstacle, the sound is called an oral stop; but if, on the contrary, the breath passes out through the nose, it is called a nasal stop (*n, m*). By philologists mutes are usually designated surd, sharp or smooth (*tenues*); sonant, flat, middle or medial (*mediæ*); and aspirate or rough (*aspiratæ*). Stopped or short mute consonants are produced by a complete closure at some point in the mouth (*k, t*). Open consonants are formed by narrowing the oral passage without complete contact (*th, kh, s*). With respect to the point of occlusion, mutes are classified as gutturals (front or back), *k, kh, g, gh;* palatals, *c, ch, j, jh;* linguals (cerebrals, cacuminals), *ṭ, ṭh, ḍ, ḍh;* dentals, *t, th, d, dh;* and labials (lip stops), *p, ph, b, bh.* According to recent scientific classification, the consonant system is divided, according to the point of formation, into back or guttural, front or palatal, point (including blade), teeth, and lip consonants; according to the conformation of the vocal organs, into open, divided, stopped, and nasal consonants, and trills. The essential psychological condition for the mutes lies not in the closure but in the reopening of the oral passage, while their quality is determined by the presence or absence of breath and by the point of occlusion. Consult Henry Sweet, *Sounds of English* (Oxford, 1908); Walter Rippmann, *The Sounds of Spoken English* (London, 1910); Otto Jespersen, *Lehrbuch der Phonetik* (Berlin, 1913); P. E. Passy, *Les sons du français* (Paris, 1913); Wilhelm Viëtor, *Elemente der Phonetik des Deutschen, Englischen und Französischen* (Leipzig, 1914).

MUTHER, mōō'tẽr, RICHARD (1860–1909). A German critic and historian of art. He was born at Ohrdruf and studied at Heidelberg and at Leipzig, where he took his doctor's degree. In 1883 he was privatdocent at the University of Munich and in 1885 conservator of the cabinet of prints. At Breslau, where he was appointed assistant professor in 1894, he became full professor the next year. He was one of the most prominent German art historians of his time, and is especially known for his writings on nineteenth-century art. His style is bright and interesting, with a slight tendency towards the journalistic, and his criticism, though subjective, is highly appreciative. His principal work is *Geschichte der Malerei des 19ten Jahrhunderts* (1893; Eng. trans., *History of Modern Painting*, new ed., 4 vols., 1907). Another important work, written from the psychological point of view, is *Geschichte der Malerei* (5 vols., 1899–1902; in English as *The History of Painting*, trans. and ed. by George Kriehn, 2 vols., 1907).

MUTI IBN IYAS, mōō'tẽ ĭbn ẽ'yȧs. An Arabic poet of the eighth century. His father was a Palestinian and with Hajjaj against Abd Allah ibn Zubair (q.v.); but he was himself born at Kufa, and after the fall of the Ommiad dynasty he became attached to the court of Al Mansur, where he remained until his death. He is the first representative of the new school of Arabic poetry that flourished at Bagdad and is characterized by delicacy, refinement, and frivolity. Consult: Ignaz Goldziher, *Abhandlungen zur arabischen Philologie*, vol. i (Munich, 1896); Carl Brockelmann, *Geschichte der arabischen Literatur*, vol. i (Weimar, 1898); R. A. Nicholson, *A Literary History of the Arabs* (New York, 1907).

MU'TIA'NUS, mōō'tĭ-ā'nụs, CONRADUS RUFUS (1471–1526). A German humanist, whose name in the vernacular was Konrad Mut. He was born at Homberg, studied under Hegius at Deventer, then at Erfurt, and for seven years in Italy. Thence he brought to Germany the idea of a humanistic association or academy, and by his letters from Gotha became the centre of the *Mutianische Bund*, which included Justus Jonas and Camerarius. Although he did not make common cause with Luther, Mutianus and his followers boldly attacked the abuses of the Church, and it seems certain that the *Epistolæ Obscurorum Virorum* (q.v.) owed their authorship to this circle. Consult C. Krause, *Der Briefwechsel des Conradus Mutianus* (Kassel, 1885), and Gilbert, *Der Briefwechsel des Conradus Mutianus* (Halle, 1890).

MU'TINA. The Roman name of the city of Modena (q.v.).

MU'TINY (from OF., Fr. *mutin*, mutinous, from *meute*, sedition, from ML. *mota*, revolt, *muta*, change, from Lat. *mutare*, to change). Mutiny at military law is unlawful opposition

or resistance to lawful military authority with intent to subvert the same or to nullify or to neutralize it for the time. (Winthrop, *Military Law*, p. 892.) In the United States the acts constituting mutiny are exciting, causing, or joining in any mutiny or sedition in any troop, battery, company, party, post detachment, or guard, and are punishable with death or such other punishment as a court-martial may direct. (Twenty-second Article of War.) The punishment of death or such other punishment as a court-martial may adjudge may be inflicted on any person in the naval service who commits any of the acts which constitute mutiny. (Revised Statutes, § 1624.) In England an annual act of Parliament passes to punish mutiny in the army and navy. (See MUTINY ACT.) Under the British articles "every one commits felony, and is liable upon conviction thereof to penal servitude for life as a maximum punishment, the maximum alternative term of imprisonment being three years, who maliciously and advisedly endeavors (*a*) to seduce any person serving in His Majesty's forces by sea or land from his duty and allegiance to His Majesty; or (*b*) to incité or stir up any such person to commit any act of mutiny, or to make or endeavor to make any mutinous assembly, or to commit any traitorous or mutinous practice whatever."

While mutiny is, in general, a concerted proceeding, a single officer or soldier may commit the offense. It is an offense punishable with death for a soldier or officer being present at a mutiny not to use his utmost endeavor to suppress it, or, having come to the knowledge of a mutiny (or intended mutiny), not to give information of it to his commanding officer. (British and American Articles of War.)

Acts not characterized by an intent to subvert lawful authority, while they do not come within the legal definition of mutiny, may be regarded and punished as conduct tending to mutiny but clear of the completion or commission of the offense. The law makes a distinction between mutiny and mutinous conduct, the latter being charged, and tried by court-martial, not under the mutiny articles, but as conduct to the prejudice of good order and military discipline.

Mutiny at Maritime Law is committed when there is a usurpation of the authority and command of a ship and an overthrow of that of the master or commanding officer. Any conspiracy to accomplish such an object, or to resist a lawful command of the master for such purpose; any endeavor to stir up others of the crew to such resistance, is an endeavor to commit a revolt within the meaning of the Statute of 1790. (1 Stat. L., 113; *Abbott's National Digest*, 3. Mutiny.) The offense of making a revolt or mutiny on a ship is no longer punishable as a capital offense. (Act of March 3, 1835.)

For United States law on the subject of mutiny, see Revised Statutes, § 1324, Arts. 22 and 23; § 1624, Arts. 4 and 8; §§ 4956, 5359, 5360.

MUTINY ACT. An act of the British Parliament passed from year to year, investing the crown with powers to regulate the government of the army and navy and to frame the articles of war. By the Bill of Rights the maintenance of a standing army in time of peace, unless by consent of Parliament, was declared illegal, and from that time the number of troops to be maintained and the cost of the different branches of the service have been regulated by an annual vote. But Parliament possesses a further and very important source of control over the army. Soldiers, in time of war or rebellion, being subject to martial law, may be punished for mutiny or desertion; but the mutiny of Dumbarton's Scottish regiment soon after the Revolution of 1688 raised the question whether military discipline could be maintained in time of peace, and it was decided by the courts of law that, in the absence of any statute to enforce discipline and punish military offenses, a soldier was amenable only to the common law of the country. The authority of the Legislature thus became indispensable to the maintenance of military discipline, and in 1689 Parliament passed the first Mutiny Act, authorizing, for a period of six months, the punishment of desertion by martial law. Subsequently this Act was passed at the beginning of each session and by limiting its duration to one year annual sessions of Parliament were made indispensable. In July, 1879, the Mutiny Act and the Articles of War were consolidated with a few changes into a complete military code called the Army Act, passed annually as before.

MUTSU, mụt'sụ *or* mụt's', MUNEMITSU, COUNT (1842–97). A Japanese statesman, born in Wakayama. He visited Europe in 1871, became Governor of Kanagawa when he returned to Japan, and in 1874 was made Secretary of the Senate. Involved in Saigo's rebellion, he was imprisoned in 1878, but was pardoned in 1882. In 1885 he traveled in America and Europe. He served as Ambassador to the United States in 1888–90, and then, returning to Japan, held the portfolio of Agriculture and Commerce. From 1892 to 1896 he was Minister of Foreign Affairs in the cabinet of Marquis Ito. In 1894 he obtained a treaty with Great Britain, in which the latter gave up the privilege of extraterritorial jurisdiction in Japan, and for this service he was made Count.

MUTSUHITO, mụt'sụ-hē'tō *or* mụ-t'-sē'tō. See MEIJI TENNO.

MUTTON BIRD. See SHEARWATER.

MUTTON FISH. 1. A fish of the large, widespread group of eelpouts, the eelpout or mother of eels (*Zoarces anguillaris*) of the North Atlantic coasts. It feeds upon shellfish, may be caught with a hook in the bays north of Cape Cod, and reaches a weight of six to seven pounds. It spawns in late summer and produces a few large eggs. 2. One of the snappers (*Neomenis analis*) of the West Indies. 3. One of the mojarras (*Gerres olisthostomus*), also called Irish pompano. See MOJARRA.

MUT'TRA. The capital of a district of the same name, in the United Provinces, British India, 30 miles northwest of Agra, on the right bank of the Jumna (Map: India, C 3). The city extends in crescent form for about 1½ miles along the right bank of the river, to which access is facilitated from a paved street by numerous ghats and chatburahs, ornamented with pavilions and temples. It is one of the great pilgrim resorts of India, and the devotional ablutionary exercises of the mixed crowds morning and evening constitute one of the characteristic sights of the city. The part of the city known as Braj Mandal is sacred to the memory of Krishna. Ravines intersect the town, though the streets are wider and straighter than in most Indian towns. The Hardinge, or Holi entrance gate, is a notable

monument, and the houses of some of the wealthier native class are adorned with fine sculptures. There are numerous mosques and temples. The mosque of Aurungzebe is the oldest, dating from 1669. Among interesting remains are the ruins of Akbar's fort, centrally situated on the river bank, and the observatory built by the celebrated astronomer Jey Singh, who became Prince of Amber in 1693, still containing several astronomical instruments. Modern features are the museum, with an extraordinary collection of ancient sculptures unearthed at Muttra, botanical gardens, the European churches, and the extensive military cantonments to the south of the city. As early as the fourth century Muttra is mentioned as a centre of Buddhism. As the reputed birthplace of Krishna and his brother Balarama, it is annually visited by thousands of pilgrims on the occasions of its religious festivals. The river abounds with turtles, and the streets swarm with monkeys, peacocks, parrakeets, and sacred bulls, which are permitted to roam at large, protected and fed by the people. Muttra anciently was of great importance, and its splendor and wealth made it an object of attack to the first Afghan invaders; Mahmud of Ghazni in 1017 plundered and burned the city and carried off idols of gold, silver, and precious stones valued at $15,000,000. In 1500, 1636, 1669, and 1756, it again suffered capture and spoliation. Since the British occupation in 1803 it has regained some of its former importance. During the Indian Mutiny of 1857 the Sepoys here murdered their British officers and joined the insurgents at Delhi. Muttra is increasing in commercial importance. It is a large banking centre, manufactures blank books and brass idols, has cotton gins and compresses, and has a large trade in sugar, cotton, grain, and metals. Pop., 1901, 60,042; 1911, 58,183.

MU'TUALISM (from *mutual*, from OF. *mutu*, from Lat. *mutuus*, reciprocal, from *mutare*, to change). That type of symbiosis (q.v.) in which each symbiont is believed to gain by the presence of the other. It has not been absolutely proved that a case of complete mutualism exists, though in the root tubercles (q.v.) of the Leguminosæ the evidence for mutualism is very strong.

MU'TULE (Lat. *mutulus*, bracket, mutule, modillion). A rectangular block under the corona, or projecting portion, of the cornice of the Doric order. One is regularly placed over each triglyph and metope. On each mutule are worked three rows of six *guttæ* or drops. They probably represent the heads of the nails by which the wooden block (forerunner of the mutule) was fastened in the primitive brick and wood style from which the Doric order developed. Consult A. Marquand, *Greek Architecture* (New York, 1909).

MUTUUM, mū'tū-ŭm (Lat., loan). A loan of any article or commodity for consumption by the borrower, who agrees to return the article in kind. The term and the rules governing such contracts originated in the Roman law, and were adopted into the English and Scots law at an early period and became a part of the common law. A mutuum is not a true bailment, as the article itself is not to be returned; and it does not create a debt, as no money payment is to be made. The title to the commodity lent passes to the borrower, and therefore it seems like a contradiction in terms to employ the terminology of bailments to such contracts. It has been held in a few States that the delivery of grain to a miller for grinding is a contract of mutuum, and that the miller is only bound to return flour of the same quality that the grain delivered would have produced. The important effect of this doctrine on such a state of facts would be that the miller would still be bound to deliver the flour if the grain were destroyed. Consult Story, *Bailments*.

MUY'BRIDGE, Eadweard (1830–1904). A photographer whose work made possible the development of the moving picture (q.v.). His name was originally Edward James Muggeridge. Born at Kingston-on-Thames, England, he early removed to the United States, where he became director of photographic surveys for the national government. In 1870, by a series of negatives of a horse trotting, he demonstrated that in this kind of movement there is a moment when all the feet are off the ground, thus settling an old controversy. Muybridge made experiments on the stud-farm of Senator Leland Stanford at Palo Alto, Cal., and gradually widened the scope of his studies. In 1881 a machine invented by him and called the zoophraxiscope reproduced on a screen horse races, the flight of birds, and athletic contests. The same year he lectured before the electrical congress in Paris; and in London he spoke before both the Royal Institution and the Royal Society. When in England Muybridge lived at Kingston, and it was there that he died. He published: *The Horse in Motion* (1878); *Animal Locomotion* (11 vols., 100,000 photographic plates, 1887), abridged and divided as *Animals in Motion* (1899; 3d ed., 1907) and *The Human Figure in Motion* (1901; 3d ed., 1907).

MUYSCA, mụ-ē'skȧ. A confederacy of South American Indians. See Chibcha.

MUZAFFAR ED DIN, mo͞o-zä'fẽr ĕd dēn' (1853–1907). Shah of Persia, the second son of Nasr ed Din (q.v.). He was born at Teheran, March 25, 1853. He was appointed Governor of the Province of Azerbaijan, but was recalled for failing to suppress an uprising of the Kurds. Already declared heir apparent during his father's lifetime, Muzaffar ed Din became Shah June 8, 1896, after Nasr ed Din's assassination by a Babi (see Babism) on May 1. In early life a fanatical Mohammedan, he showed great tolerance as Shah, particularly in his repression of an outbreak against the Christian Armenians at Kazoni in 1899. At his accession he further relieved his subjects of the taxes on meat and bread and likewise abolished the system of purchase of civil and military positions. European influences, especially those of the English and Russians, were responsible for his changed attitude. He visited Europe in 1900, 1902, and 1905. In 1906 he made the first step towards establishing a parliamentary government by summoning a partially elective National Assembly. See Persia.

MUZAFFARPUR, mŭz'ȧf-ẽr-po͞or'. The capital of a district in Bengal, British India, on the right bank of the Little Gandak River, 37 miles northeast of Patna (Map: India, E 3). It is a well-built town with a numerously attended high school, a college (established in 1899), and a German mission. In its jail are manufactured castor oil, carpets, aloe fibre and cloth. Saltpetre is largely mined in the district, and there is a considerable trade in indigo and saltpetre. Pop., 1901, 45,617.

MUŽÁKOVÁ, mu̯'zhä-kō-vä, JOHANNA (1830–99). A Bohemian novelist, known by her pseudonym, Karolina Světlá. She was born at Prague, and her name was Rott before she married Professor Mužák. After 1858, when her first novel, *Double Awakening,* was published, she produced more than 50 works of fiction, such as *Láska k básnikovi* (Poet's Love, 1860); *Prvni Ceška* (First Czech Woman, 1861); *Vesnický roman* (Village Romance, 1869; Ger. trans. by Alexis, 1900); *Frantina* (1870); *Kriz a potoka* (The Cross beside the Stream, 1868); *Barbara* (1873); besides essays, memoirs, and songs. Mužáková is at her best in novels and sketches dealing with Czech village life. Many of these have been translated into French, German, and other languages. Her collected works appeared at Prague in six volumes (1892–94). —Her younger sister, SOFIA (PODLIPSKA) (1833–97), was a writer of historical romances.

MUZIANO, mōō'tsē-ä'nō, GIROLAMO (1528–92). An Italian painter of the Mannerist school. He was born at Aquafredda, near Brescia, whence he was also called Bressano. He was a pupil of Girolamo Romanino, and afterward studied in Venice. Proceeding to Rome, he adopted the manner of Michelangelo, whose favor he gained by his first painting of importance, "The Resurrection of Lazarus," now in the Quirinal Palace. He is best known for his improvement of mosaics and the foundation of the Academy of St. Luke, which was largely due to his efforts and endowment. He was also celebrated among contemporaries for his landscapes. Most of his pictures are in the palaces and churches of Rome. Among the best are: "Christ Giving the Keys to Peter" and "St. Jerome Preaching," both in Santa Maria degli Angeli, and the "Circumcision" in the church of the Gesù. Though an imitator of Michelangelo, he preserved some of the excellences of Venetian coloring.

MWERU. See MOERO.

MWUTAN-NZIGE, mwōō'tän-n'zē'gā. See LAKE ALBERT.

MYA, mī'ä. See CLAM.

MYALGIA, mī-ăl'jĭ-ä (Gk. *μῦς, mys,* muscle + *ἄλγος, algos,* pain). See RHEUMATISM, MUSCULAR.

MY'ALI'NA (Neo-Lat., dim. of Lat. *mya,* from Gk. *μύαξ, myax,* sea mussel, from *μῦς, mys,* muscle, mussel, mouse). A fossil pelecypod somewhat resembling in shape a mussel (*Mytilus*), that is very common in the Carboniferous and Permian rocks, and hence an index fossil of those periods. The genus is of interest also as possibly representing an intermediate stage between the Aviculidæ and Mytilidæ, with both of which families it has characters in common.

MYCALE, mĭk'ä-lē (Lat., from Gk. *Μυκάλη, Mykalē*). The ancient name of a mountain, now called Samsun, in south Ionia, Asia Minor (Map: Greece, Ancient, E 3). It terminates in the promontory of Cape Santa Maria, opposite Samos. To the shore of this promontory the fleet and army of Xerxes withdrew in 479 B.C. on the news of the approach of a Greek fleet. The Greeks under the Spartan King Leotychides and the Athenian Xanthippus, father of Pericles, followed them, landed, and after a severe struggle stormed the Persian camp and burned the ships.

MYCE'LIUM (Neo-Lat., from Gk. *μύκης, mykēs,* fungus + *ἦλος, hēlos,* nail, wart). The characteristic vegetative body of the true fungi. In general it consists of branching, more or less interwoven filaments (hyphæ), which in some cases include a continuous cavity (cœnocytic), and in other cases have cross walls (septate). The mycelium may be very open and delicate, or it may be feltlike, or even form a compact body, as in lichens. The mycelium establishes absorbing connections with its food supply (substratum), and when these connections are definite and more or less specialized, they are called haustoria (suckers). In the case of a parasite the substratum is either the surface or the internal tissues of the host. The mycelium also produces vertical branches (sporophores), which in a variety of ways give rise to spores. See FUNGI.

MYCE'NÆ (Lat., from Gk. *Μυκῆναι, Mykēnai*). An ancient city of Greece, on a steep hill in the northeast corner of the Argolic Plain, commanding the passes towards Corinth (Map: Greece, Ancient, C 3). It was said to have been founded by Perseus and to have been ruled by his descendants until they were superseded by Pelops. It is celebrated in legend as the capital of Agamemnon. Here was laid the scene of the terrible story of the house of Atreus, and here was stored the wealth of Agamemnon. After the epic period the city seems to have been completely overshadowed by the power of Argos, but it still preserved a quasi independence, for during the Persian wars, when Argos was friendly to Persia, we hear of 80 Mycenæans at Thermopylæ (479 B.C.), and along with Tiryns it sent 200 men to Platæa. Later Mycenæ joined the Spartan League, but when the Spartans were occupied by the revolt of the Helots, in 463 B.C., the Argives besieged the city and expelled the inhabitants. From that time the place was the seat of a small village community, who in the time of Pausanias showed visitors the graves of Agamemnon and his household. The destruction of the city by the Argives did not greatly injure the massive Cyclopean wall; and this fortification, still preserved to a considerable height, with the Lion Gate (q.v.), so called from the reliefs on the triangular slab over the lintel, and the domed tomb outside, commonly called the Treasury of Atreus, had attracted the attention of archæologists long before Heinrich Schliemann (q.v.) in 1876 began his excavations. These opened an entirely new field in Greek archæology by the discovery just inside the Lion Gate of a carefully inclosed circle, evidently a sacred inclosure, within which at a considerable depth were five shaft graves, hewn in the rock, and containing a number of bodies, with an extraordinary mass of gold and silver ornaments, swords, and vases. These are now in the National Museum at Athens. Over one grave was a small circular altar. Since that time the Greek Archæological Society has continued the excavations, for the most part through Dr. Chrestos Tsountas, whose accurate and careful methods have proved highly successful. Besides the Treasury of Atreus eight other domed tombs and a very large number of smaller rock-cut chambers for burial have been opened. Within the wall a sixth grave was discovered near the others, the foundation walls of smaller houses were laid bare, while near the summit of the Acropolis were found the ruins of a palace showing great similarity to a palace at Tiryns. The discoveries at this site first brought into

prominence that special period of Ægean civilization which preceded the historic Hellenic culture, and hence the name Mycenæan has been given to this age and civilization. For the general characteristics of Mycenæan art and for illustrations, see ARCHÆOLOGY, III, *Mycenæan Period;* ATREUS, TREASURY OF.

Bibliography. Heinrich Schliemann, *Mycenæ: A Narrative of Researches and Discoveries* (new ed., New York, 1880); Carl Schuchhardt, *Schliemann's Excavations*, translated by Eugenie Sellers (London, 1891); Tsountas and Manatt, *The Mycenæan Age* (Boston, 1897); new edition in progress in 1915; H. R. Hall, *The Oldest Civilization of Greece* (Philadelphia, 1901); William Ridgeway, *The Early Age of Greece*, vol. i (New York, 1907); K. Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909); H. R. Hall, *The Ancient History of the Near East* (London, 1913); id., *Ægean Archæology* (ib., 1915).

MYCENÆAN (mī'sē-nē'an) **PERIOD.** See ARCHÆOLOGY.

MY'CERI'NUS. An Egyptian king, the sixth of the fourth dynasty. His name, written by Herodotus as above and by Diodorus as Mecherinus, is, following the Egyptian form, Menkaura. He built a pyramid southwest of Ghizeh, the third in size and the first in point of preservation. In it in 1837 were found his stone sarcophagus (afterward lost at sea) and fragments of his wooden coffin. Mycerinus was famed for his piety. He is the subject of one of the early poems of Matthew Arnold.

MY'CETO'MA. See MADURA FOOT.

MY'CETOZO'A (Neo-Lat. nom. pl., from Gk. *μύκης, mykēs*, fungus + *ζῷον, zōon*, animal). A name given to the Myxomycetes (q.v.) by those who regard them as animals rather than plants. See PROTOZOA.

MYCONIUS. See MYKONIUS.

MY'COPHYLAX'INS. See IMMUNITY.

MY'CORRHI'ZA (Neo-Lat., from Gk. *μύκης, mykēs*, fungus + *ῥίζα, rhiza*, root). The whole structure formed by the intimate association of certain fungi with the roots of higher plants. The fungi either grow inside the cells of the cortex (endotrophic mycorrhiza) or invest the young absorbing portions of the roots with a jacket of interwoven hyphæ (ectotrophic mycorrhiza, Fig. b). Recent investigations have shown that mycorrhizal fungi are very widespread and that they are associated with perhaps more than half of the higher plants. They are particularly abundant in humus, and the conclusion has been reached that a large number of humus plants are very much benefited by their presence, and further, that some plants, such as the Indian pipe, certain orchids, and even the European beech tree, are unable to complete their normal life cycle in sterilized soil. There are apparently all degrees of interdependence between these fungi and higher plants, ranging from an occasional temporary infection, through stages where there is a regular annual development of the mycorrhiza upon many or all of the roots, as seen on such forest trees as many of the oaks, the hickories, and the basswood, to very close and perpetual unions of the two organisms, extending from the earliest development of the seedlings throughout the entire life of the higher plant.

The English heather (*Calluna vulgaris*) has recently been found to furnish an interesting example of highly specialized mycorrhiza. The fungus is present in the testa of the seed and infects the seedling immediately after germination. Should such an infection fail, as in experimental sterile cultures, the seedlings fail to develop roots, although they may live for several weeks. The fungus persists during the entire life of the heather plant and is present not only in the roots but also in the stem, flowers, and fruit, although limited to the testa in the seed. A similar dependence upon such

MYCORRHIZA.

a, root and rootlets of *Carpinus betulus*, showing the coralloid character of mycorrhiza.
b, end of root of the beech (*Fagus sylvatica*), showing mat of fungus threads; more highly magnified than *a*.

fungi is found in many epiphytic orchids, most of which do not thrive in the absence of the mycorrhiza, while in many the seedlings develop only when infected by the fungus. This explains the practice among gardeners of sowing orchid seeds among the roots of orchid plants. Several of the mycorrhizal fungi have been identified as the mycelial stages of large fleshy fungi belonging to the genera *Agaricus, Russula, Scleroderma*, and *Phoma*.

The physiological relation between the fungus and the higher plants is still very imperfectly known. It is believed that often by its digestive powers the fungus secures and prepares certain foodstuffs, especially those containing nitrogen, and that eventually the higher plants use and benefit by these nitrates. The fungus may also to a certain extent aid in the absorption of the water used by the higher plant. Doubtless in many instances, however, the fungus is simply parasitic upon the roots of its host, getting from it carbohydrate foods. Con-

sult: Frank, *Ueber die Verdauung von Pilzen abzielende Symbiose der mit endotrophen Mykorrhizen begatteten Pflanzen* (Berlin, 1891); Bernard, "Les orchidées et leur champignons commensaux," in *Annales des Sciences Naturelles: Botanique*, vol. ix (9th series, Paris, 1909); Hans Burgeff, *Die Wurzelpilze der Orchideen* (Jena, 1909); W. B. McDougall, "Mycorrhiza of Forest Trees," in *American Journal of Botany*, vol. i (Lancaster, Pa., 1914); Rayner, "Obligate Symbiosis in Calluna Vulgaris," in *Annals of Botany*, vol. xxix (London, 1915). See SYMBIOSIS.

MY'COSO'ZINS. See IMMUNITY.

MYD'DELTON, or **MIDDLETON,** SIR HUGH (c.1560–1631). A British contractor, born at Galch Hill, Denbigh, Wales. He became a London goldsmith and banker, engaged in various commercial undertakings, and was a member of Parliament from 1603 to 1628. In 1609 Myddelton began work on the New River, a canal for supplying London with water from springs in Hertfordshire. He obtained aid from King James in the undertaking in 1612, and in the following year had completed the work. The project greatly impoverished Myddelton, as it returned no profit till 1633. He was created Baronet in 1622. Consult Samuel Smiles, *Lives of the Engineers* (new ed., London, 1904).

MYD'RIAT'ICS (Gk. *μυδρίασις, mydriāsis*, undue enlargement of the pupil of the eye, + suffix *-atic*, pertaining to). Drugs which produce dilatation of the pupil of the eye. Many of them also produce cycloplegia, i.e., paralysis of the ciliary muscle, which controls accommodation. The principal mydriatics for examination of the eye are atropin, homatropin, and cocaine; others less used are hyoscyamin, duboisin, daturin, scopolomin, muscarin, mydrin, euphthalmin, and ephedrin. Atropin is the typical mydriatic, and acts by paralyzing the sphincter of the pupil, at the same time stimulating the dilator. It paralyzes the ciliary muscle completely. Drugs which contract the pupil are called miotics (q.v.).

MYELAT, mē'ā-lât (Bur., unoccupied country). A division of Burma, India, comprising 16 of the southern Shan States. Total area, 3723 square miles. The region is sparsely populated. The chief industry is the cultivation of rice and sugar cane. Pop., 1901, 119,415.

MYELI'TIS (Neo-Lat., from Gk. *μυελός, myelos*, marrow). An inflammation of the substance of the spinal cord which may be limited to the white or the gray matter or involve the whole cord or isolated portions of it. When the white matter is inflamed with the meninges it is called cortical myelitis; when the gray matter only is affected it is known as central myelitis. The disease may extend transversely, or may proceed in an upward or downward direction. The causes are, in general, injuries of various kinds, exposure, and overexertion; the infectious diseases, such as measles, typhus fever, and smallpox, rheumatism or syphilis, mercurial or arsenical poisoning; and caries or tumors of the spine or the cord itself. The symptoms depend upon the extent and location of the inflammatory process. A transverse myelitis, e.g., produces paraplegia, or complete paralysis of all the voluntary muscles whose nerve fibres arise from nuclei below the seat of the lesion. There are rectal and vesical paralysis, girdle pains, bedsores, and disturbances of sensation. Treatment is entirely symptomatic. The prospects of recovery are bad in myelitis, particularly in the ascending form and that variety involving the trophic centres. In some mild cases the patients recover completely, in others only partly.

In children a specific form of the disease attacks the anterior horns of the gray matter (when it is called *poliomyelitis*, or infantile spinal paralysis). See POLIOMYELITIS.

MY'ER, ALBERT JAMES (1827–80). An American army officer and meteorologist, born at Newburgh, N. Y. He graduated at Hobart College and took his degree in medicine at the Buffalo Medical College in 1851. In 1854 he was appointed assistant surgeon in the United States army and was assigned to Texas, where he first developed his celebrated signal system of flags by day and torches by night, which afterward came into general use. In 1860 he was commissioned major and made chief signal officer of the army. On the outbreak of the Civil War he was made signal officer on the staff of General Butler and afterward on that of General McClellan, and was successively brevetted lieutenant colonel, colonel, and brigadier general, his last promotion being for distinguished services in organizing, instructing, and commanding the signal corps of the army and for especial service on Oct. 5, 1864, at Allatoona, Ga., where his signal system enabled the apparently doomed garrison to summon assistance from the main army. On July 28, 1866, he was made colonel in the regular army and chief signal officer. In 1870 the signal corps, under his direction, commenced observing and giving notice by telegraph of the approach and force of storms on the northern lakes and seacoast, at the military posts in the interior, and at other points in the States and Territories. In 1873 Myer organized, and thereafter promoted, international simultaneous daily meteorological observations, published as daily bulletins with maps. He published *A Manual of Signals for the United States Army and Navy* (1868). A short time before his death he was promoted to the full rank of brigadier general of the United States army.

MYER, FORT. See FORT MYER.

MY'ERS, CORTLAND (ROOSA) (1864–). An American Baptist clergyman. He was born at Kingston, N. Y., graduated from the University of Rochester in 1887 and from the Rochester Theological Seminary in 1890, and served as pastor of the First Church, Syracuse, N. Y. (1890–93), of the First Church, Brooklyn (1893–1909), and thereafter of Tremont Temple, Boston. He received the degree of D.D. from Temple University, Philadelphia, in 1899. His writings include: *The Best Place on Earth* (1893); *American Guns* (1898); *Why Do Men not Go to Church?* (1899); *Making a Life* (1900; 2d ed., 1913); *The New Evangelism* (1903); *The Boy Jesus* (1908); *Real Prayer* (1911); *When Heaven Touched the Earth* (1912).

MYERS, FREDERIC WILLIAM HENRY (1843–1901). An English poet and essayist, born Feb. 6, 1843, at Keswick, where his father was incumbent of St. John's Church. He was educated at Cheltenham and at Trinity College, Cambridge, graduating with distinction and gaining a fellowship in his college (1865). His taste for poetry was shown in his boyhood. He delighted in Homer, Æschylus, Lucretius, in fragments of Sappho, and in Pindar. Before quitting school he had learned all Vergil by heart. He was for many years inspector of

schools. In 1882 he took an active part in founding the Society for Psychical Research, of which he became president. He died in Rome, Jan. 17, 1901. The verse of Myers, which belongs mostly to an early period, comprises *St. Paul* (1867); *Poems* (1870); *Renewal of Youth* (1882). In these collections are pieces of rare beauty, which give the author one of the first places among the lesser poets. Myers undoubtedly wrote some of the finest essays of his time in *Essays Classical and Modern* (1883) and in *Science and a Future Life* (1893). He also prepared for the "English Men of Letters Series" an admirable *Life* of Wordsworth (1881). His work in psychical research is represented by his contributions to the *Phantasms of the Living* (1886), which embodied the first considerable results of the labors of the Society for Psychical Research. After his death appeared a book on the evidences of immortality entitled *Human Personality and its Survival of Bodily Death*, edited by R. Hodgson and A. Johnson (London, 1903), and *Fragments of Prose and Poetry* (1904). Consult the *Athenæum* (London, Jan. 26, 1901); A. C. Benson, *The Leaves of the Tree* (New York, 1911).

MYERS, Henry L. (1862–). An American legislator. He was born in Cooper Co., Mo., was educated in local schools, and practiced law at Boonville and West Plains, Mo., from 1885 to 1893. Moving to Hamilton, Mont., in the latter year, he was prosecuting attorney for Ravalli County in 1895–99, Democratic member of the Montana Senate from 1899 to 1903, and district judge of the fourth judicial district of Montana in 1907–11. He was elected United States Senator for the term 1911–17.

MYERS, Jerome (1867–). An American figure and landscape painter. He was born in Petersburg, Va., and studied at the art school of Cooper Union and the Art Students League, New York. Myers is best known for his street scenes of New York, especially of the lower East Side. His execution is careful, with moderate color schemes and little contrast of light and shade. An example of his work is "The Night Mission," in the Metropolitan Museum of Art.

MYERS, Philip Van Ness (1846–). An American historian, born at Tribes' Hill, N. Y. He graduated at Williams College in 1871 and studied at Yale Law School (1873–74). After two years in Europe he returned to the United States and became president of Farmers' College, Ohio, in 1879. From 1890 to 1900 he was professor of history and political economy at the University of Cincinnati, where he was also dean of the academic faculty in 1895–97. His publications include: *Life and Nature under the Tropics* (1871); *Remains of Lost Empires* (1875); *Ancient History* (1882; rev. ed., 1904); *Medieval and Modern History* (1889; new ed., 1905); *General History* (1889; rev. ed., 1906); *The Eastern Nations and Greece* (1890; rev. ed., 1904); *History of Rome* (1890); *History of Greece* (1897); *Rome: Its Rise and Fall* (1900; new ed., 1905); *The Middle Ages* (1902); *The Modern Age* (1903); *History as Past Ethics* (1913). Certain of his works became standard textbooks in high schools and colleges.

MYHRMAN, mĕr'mân, David Wilhelm (1866–). A Swedish Orientalist, born in Tuna, Kalmar. In 1892 he went to America and studied at Chicago University and at Harvard. In 1902, having taken the degree of Ph.D. at Leipzig, he was appointed docent in Assyriology at Upsala. Besides articles contributed to encyclopædias and periodicals he published: *Die Labartu-Texte* (1902); *Ur babyloniernas och assyriernas religionslitteratur* (1908); *Kitāb mu'id an-ni'am* (1908); *Aramaic Incantation Text* (1910); *Babel och Bibel* (1911); *Nouveaux noms propres* (1911); *Babylonian Hymns and Prayers* (1911); *Tusen nätter och en natt* (1912); *Upptäckterna i Babylonien och Assyrien* (1913). He was co-editor of *Babylonica* (Paris) and *Babylonian Expedition* (University of Pennsylvania).

MYIASIS, mī-yā'sĭs (Neo-Lat., from Gk. *μυῖα, myia,* fly). A medical term for the state of being infested with the larvæ of dipterous insects. A rather large number of flies may infest human beings in this way, and the disease has been divided according as the larvæ are found in the skin, in the ear, in the conjunctiva, in the intestines, in the mucous membranes, in the nose, or in wounds. The most common form is the presence of the larvæ of flesh flies, or blowflies, in open and neglected wounds. In certain portions of the United States, the screw-worm fly (*Lucilia macellaria*) deposits its eggs or larvæ not only in open sores upon the bodies of men and women, but many cases are on record where the eggs have been deposited in the nostrils of persons sleeping exposed in the daytime. These flies are especially apt to be attracted by an offensive catarrhal condition. Scores of maggots have been taken from the nasal passages of such individuals, and a complete destruction of the soft palate has been brought about in this way. The European flesh fly known as *Sarcophila wohlfarti* has been reared from larvæ found in numbers in the nasal cavities and in the ear of man. *Lucilia nobilis* of Europe has also been reared from the ear of a man, causing extensive discharges and much putrefaction. The bluebottle fly (*Calliphora vomitoria*) sometimes causes nasal myiasis, and the common flesh fly (*Sarcophaga carnaria*) has been reared from larvæ found in the nasal passages. There are also cases of myiasis of the vagina. In all of these instances the flies are either Sarcophagidæ or Muscidæ, and the adults were attracted to putrid or septic wounds or to an offensive or purulent discharge from the body, depositing their eggs or larvæ therein. Internal myiasis is nearly always caused by the larvæ or flies of the family Anthomyiidæ. These flies deposit their eggs in spoiled vegetables, which are afterward eaten in the raw state, as in salads. The larvæ of several species have been passed while still alive, and frequently cause intestinal disturbances of a more or less serious character. *Homalomyia canicularis,* e.g., has several times been reared in this way. In the family Sepsidæ the common cheese maggot (larva of *Piophila casei*), taken into the stomach with old cheese, has been found alive in excreta, having passed through the entire alimentary canal. Cutaneous myiasis, aside from that of open wounds, is produced by several of the botflies of the family Œstridæ. In tropical regions there are one or more species of the genus *Dermatobia,* which may lay their eggs upon the skin of human beings, the resulting maggot forming a pus sac below the surface of the skin and, if undisturbed, reaching its full growth in this situation. Such cases as this are not uncommon among the unclothed inhabitants of tropical countries, and persons while bathing occasionally become infested. The best known of these human botflies is *Dermatobia cyaneiventris,* common in South America.

MYKO'NIUS (properly MEKUM), FRIEDRICH (1490–1546). A German theologian of the Reformation. He was born at Lichtenfels in Upper Franconia. At 19 he entered a Franciscan cloister at Annaberg and in 1516 became a priest. In the following year Mykonius embraced Luther's teachings, and about 1524, as pastor of a church at Gotha, became one of the leaders of the Reformation. He rendered especially valuable service in Thuringia and, after 1539, in Leipzig, by reviving the primitive custom of episcopal visits to the different churches. He attended several of the conferences of the Reformation period and in 1538 was sent to England to discuss the articles of the Augsburg Confession. Mykonius' *Historia Reformationis* (1517–42), which contains much autobiographic matter, was published in 1715. Consult Ledderhose, *Friedrich Mykonius* (Gotha, 1854), and the biography by Meurer in his *Altväter der lutherischen Kirche* (Leipzig, 1864).

MYKONIUS, OSWALD (1488–1552). A Swiss reformer and friend of Zwingli. His real name was Oswald Geishüsler. He was born at Lucerne, studied and taught at Basel, then lived for three years (1516–19) at Zurich. After teaching at Lucerne and Einsiedeln he returned to Zurich (1523). About 1532 Mykonius became pastor at Basel, and was soon elected to succeed Œcolampadius as antistes of the district and professor of theology, a choice which met with Erasmus' disapproval. His great labor was the reform of the Swiss schools. In theology he mediated the views of Luther and Zwingli on the nature of the Lord's Supper, and finally came to a mystic interpretation of it. He wrote *De H. Zwinglii Vita et Obitu* (1532) and a commentary on Mark's Gospel (1538). Consult Hagenbach, *Oekolampad und Oswald Mykonius, die Reformatoren Basels* (Elberfeld, 1859).

MYLIT'TA. The name of a Babylonian goddess, according to Herodotus (I, 131, 199). She is identified with Aphrodite. In her honor sacred prostitution is practiced. When a stranger throws his money into the lap of the woman he has chosen, he utters a prayer that Mylitta may be with her. Mylitta is *Mulittu*, from *Mu'alliattu*, probably identical with Hebrew *meyalledeth* (midwife), and designates Ishtar (q.v.) as the goddess assisting women in childbirth. It is not a corruption of Belit, as has been often supposed. Consult: P. Jensen, *Die Kosmologie der Babylonier* (Strassburg, 1890); Zimmern, in Eberhard Schrader, *Die Keilinschriften und das Alte Testament* (3d ed., Berlin, 1902); E. S. Hartland, "Concerning the Rite at the Temple of Mylitta," in *Anthropological Essays* (Oxford, 1907).

MYLIUS-ERICHSEN, mụ'lĭ-ụs-ā'rĭk-sen, LUDVIG (1872–1907). A Danish author, ethnologist, and explorer, born at Viborg. With Count Harald Moltke and K. Rasmussen (q.v.) he formed the Danish literary expedition (1902–04) to West Greenland, and in the early stages (1902) discovered near Evigheds Fiord two ice-free mountain ranges. Later the party proceeded to Cape York and for 10 months lived native fashion with the Eskimo. The return journey of the expedition to Upernivik across the ice of Melville Bay was the first sledge crossing on record. As commander of the *Danmark* expedition (1905–07) Mylius-Erichsen undertook and carried out the task—considered by many to be impossible—of exploring and charting the entire coast line of unknown northeast Greenland by three months' field work. The expedition made sledge journeys of more than 4000 miles, exceeding the record of any other single Arctic force. The main travel, excluding duplications, of Koch was some 1250 miles, and that of Mylius-Erichsen must have exceeded 1000 miles. Their explorations showed that Peary's chart of a coast trending southeast from Navy Cliff was radically incorrect. Instead, the shore ran to the northeast, adding about 100,000 square miles to Greenland and extending it about halfway from Navy Cliff—where the maps wrongly placed Greenland Sea—to Spitzbergen. Mylius-Erichsen's own exploration disclosed the nonexistence of Peary's Channel, and thus established the continuity of Greenland from Cape Farewell, 60° N., to the most northern land ever reached, 83° 39′ N. He also discovered and explored the great fiords of Denmark, Hagen, and Brönlund. Misled by existing maps, Mylius-Erichsen with Hagen and Brönlund so prolonged his journey that a return to the ship was impossible, and they perished of starvation, exhaustion, and cold. Mylius-Erichsen's observation journals, left at Denmark Fiord, were brought to Copenhagen by Ejnar Mikkelsen (q.v.) in 1912. Mylius-Erichsen wrote: *Tatere* (1898), a drama; *Vestjyder* (1900), tales; *Den jydske Hede för og nu* (1903); *Isblink* (1904), poems from Greenland; *Grönland* (1906); Report on nonexistence of Peary Channel in *Meddelelser om Grönland*, vol. xli (1913), edited by Ejnar Mikkelsen. Consult: Achton Friis, *Danmark-Expeditionen til Grönlands Nordostkyst* (1909); Greely, *True Tales of Arctic Heroism* (New York, 1912); Rasmussen, *People of the Polar North* (Philadelphia, 1908); G. C. Amdrup, *Report on the Denmark Expedition to the North-East Coast of Greenland* (Copenhagen, 1913).

MY'LODON (Neo-Lat., from MGk. *μυλόδους, mylodous*, molar, from Gk. *μύλη, mylē*, mill, millstone + *ὀδούς, odous*, tooth). A gigantic extinct edentate mammal, allied to *Megatherium* and *Megalonyx*, found in the Pleistocene deposits of North and South America. See MEGATHERIUM.

MY'NA, or MI'NA BIRD (Hind. *maina*, starling). A member of any one of several closely allied genera in the starling family Sturnidæ. The common myna (*Acridotheres tristis*) is abundant throughout the Indian region, and has been introduced into the Hawaiian Islands and elsewhere where it thrives. It is 10 inches long, has the upper parts, breast, and sides brown, head and neck black, while there is a bare patch of yellow behind the eye. The wings are bound with white, the lower parts are white, and the bill is yellow. It is a ground-living species, going in large flocks and feeding on insects. The myna has a great variety of notes, some harsh, others pleasing. The loosely built nest is placed in a hole in a house or a tree; five eggs are laid. See HILL MYNA.

MY NOVEL; OR VARIETIES IN ENGLISH LIFE. A novel by E. Bulwer-Lytton (1853). The story, told by P. Caxton, is partly of Hazeldean and partly of London. The principal hero is Harley L'Estrange, witty and brilliant, the friend of Squire Hazeldean.

MYNSTER, mụn'stẽr, JACOB PETER (1775–1854). A Danish bishop, born in Copenhagen. He graduated with honors and was pastor at Spjellerup (1802–11). In essays, sermons, and treatises he declared open war on rationalism. As chaplain in Copenhagen (1811–28) he gathered large congregations and won fame. He re-

fused a professorship in Christiania and tutorship to the Crown Prince, gained the doctorate in theology (1815), and became royal confessor and pastor of the royal castle (1828). His *Betragtninger over de kristelige Troslærdomme* (1833) was very extensively read. In 1834 he was appointed Bishop of Zealand. The movement started by Grundtvig and the Christian laity for greater freedom within the Church he tried, without success, to check. Consult H. H. L. Schwanenflügel, *J. P. Mynster* (2 vols., Copenhagen, 1900–01).

MY'OCARDI'TIS (Neo-Lat., from *myocardium*, from Gk. *μῦς, mys*, muscle, mouse + *καρδία, kardia*, heart). An inflammatory affection of the wall of the heart. It is a term first used by Sobernheim in 1837. Acute myocarditis is considered as an inflammation due to infection. It is a disease secondary to typhoid fever, diphtheria, scarlet fever, cerebrospinal meningitis, variola, erysipelas, malaria, rheumatism, influenza, or septicæmia. Chronic myocarditis, an insidious affection, pathologically an "interstitial fibrosis," is due to sclerosis of the coronary arteries, which supply the heart muscle with blood. See HEART, DISEASES OF.

MY'OLEM'MA (Neo-Lat., from Gk. *μῦς, mys*, muscle + *λέμμα, lemma*, skin). See MUSCLE AND MUSCULAR TISSUE, *Striated Voluntary Muscles*.

MYOMA, mī-ō'mȧ. See TUMOR.

MY'OMANCY. See SUPERSTITION.

MY'OMOR'PHA. See RODENTIA.

MY'OPHO'RIA. A genus of important Triassic fossils, with smooth or radially sculptured shells and strong radical ridge extending backward from the beaks. There are two teeth in one and three teeth in the other valve. The genus forms a connecting series from the Permian schizodus to the highly sculptured and beautiful trigonias of the Jurassic and Cretaceous periods. See PELECYPODA.

MYOPIA, mī-ō'pĭ-ȧ (Neo-Lat., from Lat. *myops*, from Gk. *μύωψ*, shortsighted, from *μύειν, myein*, to close + *ὤψ, ōps*, eye). Short sight. A form of ametropia due to the fact that the anteroposterior axis of the eyeball is too long. Parallel rays of light, therefore, are not brought to a focus on the retina, but in front of it, forming circles of diffusion on the retina.

False or functional myopia may be brought about by spasm of the ciliary muscle, conical cornea, or swelling of the lens in incipient cataract. Myopia may be congenital, or may develop in weakly children from excessive application to study. Artists, engravers, students, and others using the eyes constantly for near work are often myopic. Excessive degrees of myopia are not unattended with dangers, among which may be enumerated detachment of the retina, the development of squint, vitreous opacities, changes in the choroid and retina, and serious impairment of vision, even when correcting lenses are worn. In what is termed malignant or progressive myopia the vitreous may become fluid, the lens dislocated, and the whole eyeball soft, total blindness being the ultimate result. See SIGHT, DEFECTS OF.

MY'OSIN. See GLOBULINS.

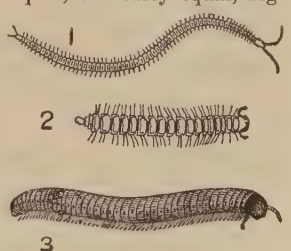
MY'OSI'TIS (from Gk. *μῦς, mys, μυός, myos*, muscle + *itis*). See MUSCLE, DISEASES OF.

MY'OSO'TIS. See FORGET-ME-NOT.

MY'RAND, ERNEST (1854–). A Canadian author. He was born in the city of Quebec and was educated at Quebec Seminary and at Laval University. He entered the Quebec civil service and later became an official in the department of the Provincial Secretary. In 1908 he was elected a fellow of the Royal Society of Canada, which awarded him a diploma of honor for his literary work. He published: *Une fête de Noël sous Jacques Cartier* (1888; 3d ed., 1911); *Sir William Phipps devant Québec, 1690* (1893); *M. de la Colombière, orateur* (1898); *Noëls anciens de la Nouvelle France* (1899; 2d ed., 1909); *Frontenac et ses amis* (1902); *Dialogues du pageants, représentés aux fêtes du Tricentenaire de Québec en 1908* (1908).

MYRES, mīrz, JOHN LINTON (1869–). An English classical scholar, born at Preston, Lancashire. He was educated at Winchester School and at New College, Oxford, was tutor at Christ Church (1895–1907), professor of Greek and lecturer in ancient geography at the University of Liverpool (1907–10), and then professor of ancient history at Oxford. He traveled much in Greece and Asia Minor, and in 1894 conducted excavations in Cyprus. In addition he devoted much attention to anthropological studies. His publications include: *A Catalogue of the Cyprus Museum* (1899), with Dr. Ohnefalsch-Richter; *A History of Rome* (1902); *The Dawn of History* (1911); *Metropolitan Museum of Art: Handbook of the Cesnola Collection of Antiquities from Cyprus* (1914); and papers on Mediterranean anthropology, archæology, and geography in various learned periodicals.

MYRIAP'ODA (Neo-Lat. nom. pl., from MGk. *μυριόπους, myriopous*, having ten thousand feet, from Gk. *μύριοι, myrioi*, ten thousand + *πούς, pous*, foot). A class of arthropods resembling annelids in their lengthened form and in the great number of equal, or nearly equal, segments of which the body is composed, but in most of their other characters more nearly agreeing with insects, among which they were ranked by the earlier naturalists. They differ from insects and all other arthropods in the fact that the posterior segments of the body bear jointed locomotor appendages. In addition to their affinities with insects, myriapods are wormlike and some of them suggest relations with the thysanurans. They have a distinct head, but there is no distinction of the other segments, as in insects, into thorax and abdomen. They have simple or compound eyes; a few are destitute of eyes. They have antennæ like those of insects. The mouth is furnished with a complex masticating apparatus, in some resembling that of some insects in a larval state, in others similar to that of crustaceans. Respiration is carried on through minute pores or spiracles placed on each side along the entire length of the body, the air being distributed by innumerable ramifying air tubes to all parts. In most parts of their internal organization the myriapods resemble insects, although a decided inferiority is exhibited, particularly in the less perfect concentration of the nervous system. The resemblance is



FORMS OF MYRIAPODS.
1, *Geophilus*. 2, *Polydesmus*. 3, *Julus*.

greater to insects in their larval than in their perfect state. The body of the myriapods is protected by a hard chitinous covering. The number of segments is various, seldom fewer than 24, although in some of the genera they are consolidated together in pairs, so that each pair, unless closely examined, might be considered as one segment bearing two pairs of feet. The legs of some of the lower kinds, as *Julus*, are very numerous, and may be regarded as intermediate between the bristle-like appendages which serve many annelids as organs of locomotion and the distinctly articulated legs of insects. In the higher myriapods, as *Scolopendra*, the legs are much fewer, and articulated like those of insects. Some of them feed on decaying organic matter, chiefly vegetable; those of higher organization are carnivorous. The myriapods do not undergo marked metamorphoses, but the young greatly resemble the adults, although some of them are at first quite destitute of feet; and, contrary to what takes place in insects, the body becomes more elongated as maturity is approached; the number of segments and of feet increase.

Myriapods are widely distributed and are represented in almost every part of the earth. They flourish in moist and dry, hot and cold climates. Like other widely distributed animals, they show great variation in size and color, ranging from microscopic size to a length of more than 6 inches. Some of the Julidæ and Polydesmidæ of the tropics are beautifully and brilliantly colored. Some of the species of *Geophilus* are phosphorescent. Most myriapods inhabit dark and obscure places. Some of the cave-inhabiting species from Wyandotte and Bradford caves in Indiana are described by Packard as light in color, and those from the latter cave have rudimentary eyes. The organs of defense throughout the class vary greatly. In the centipedes the large claws, supplied with poison from a gland, are weapons of offense and defense. The millipedes, on the other hand, rely for defense on an acid secretion from certain glands. Other forms are hairy or bristly. Hairiness was the most common mode of defense among fossil myriapods.

A fossil bristled myriapod has been found in America in Paleozoic strata, and two species have been found in the Old Red Sandstone of Scotland. The highest vetebrates in this deposit are fishes, and the highest plants are conifers. The Paleozoic species, about 40 in number, all belong to an extinct order (Archipolypoda), and most of them were of gigantic size. Later fossil myriapods, contemporaneous with giant fossil Amphibia, occur in the coal measures. One of these forms from Illinois approaches very closely the Julidæ of to-day. Only one species has been found in the chalk layers, but in Tertiary and recent times plentiful remains have been found. The majority of these belong to the Chilognatha and Chilopoda. They have been found in the gypsum of France, in the brown coal of Germany, and in the Green River formation of North America. Amber has also yielded several species.

Classification. The class Myriapoda is now divided into five orders, the Chilognatha or Diplopoda, the Chilopoda or Syngnatha, the Schizotarsia, the Symphyla, and the Pauropoda. To the Chilopoda belong the common thousand-legs of the family Julidæ, as well as the representatives of seven other families, all of which bear two pairs of legs to each of the body segments except the first three. Verloef states that the males of some of the Julidæ undergo certain seasonal changes. In the spring and autumn the form of the legs and other organs changes. These seasonal changes are correlated with the sexual condition of the *Julus*, just as the males of certain birds and fishes show a brighter coloration and other changes at the breeding season. *Julus* will feed freely in captivity if the earth is kept at the proper moisture and proper food is furnished plentifully. They will thrive on grass, leaves, and bits of apple and pear. The eggs are numerous, from 60 to 100 being deposited at a laying. The female forms a receptacle for the eggs some distance below the surface of the ground. It is in the shape of a hollow sphere and is composed of little pellets of mud, which are molded by her jaws and front legs. The nest is perfectly smooth within, but the outside is rough and shows the pellet composition. In the top of the sphere a small opening is left until the eggs are laid. The hole is then plugged up with earth and the eggs are left to chance. The chilopods have many-jointed antennæ and only one pair of legs to each joint. To this group belong the large tropical centipedes of the family Scolopendridæ and the long slender Geophilidæ, as well as the Lithobilidæ and Notophilidæ.

The order Schizotarsia contains but a single family, the Scutigeridæ, of which the common household centipede of the United States (*Scutigera forceps*) is a familiar example. This creature, although viewed with horror by careful housekeepers, preys upon house flies and small cockroaches, and is by no means an entirely undesirable denizen of households. It is prevalent in the Southern States, and extends as far north as the Hudson River Valley. The order Symphyla contains the single family Scolopendrellidæ, which have a great resemblance to certain of the Thysanura among the insects. The order Pauropoda consists of the single family Pauropodidæ, which contains only three genera. The type genus, *Pauropus*, a curious crustacean-like form, was first discovered by Lord Avebury (Sir John Lubbock) in his kitchen garden in 1866.

Consult: S. H. Scudder, "Systematic Review of our Present Knowledge of Fossil Insects, Including Myriapods and Arachnids," in *United States Geological Survey, Bulletin No. 31* (Washington, 1886); C. H. Bollman, "Myriapoda of North America," in *United States National Museum, Bulletin No. 46* (ib., 1893); F. G. Sinclair, in *Cambridge Natural History*, vol. v (London, 1895). See CENTIPEDE.

MYRICA, mĭ-rī'kȧ. A genus of Asiatic and North American shrubs. See CANDLEBERRY.

MYRI'NA. The name of an ancient city on the island of Lemnos (q.v.).

MYRIS'TIC ACID (from Neo-Lat. *Myristica*, from Gk. *μυριστικός*, *myristikos*, suitable for anointing, from *μυρίζειν*, *myrizein*, to anoint, from *μύρον*, *myron*, unguent). A saturated crystalline fatty acid, $C_{13}H_{27}.COOH$, found in nutmeg, the seed of *Myristica fragrans*, growing on the Molucca Islands and cultivated in tropical countries. It occurs in the form of a glyceride in the fat of the nutmeg, or nutmeg butter. It has also been found in small quantity among the products of the saponification of spermaceti and of the fatty matter of milk, and hence this organic acid is one of those which are common to both the animal and vegetable kingdoms.

MYR'MECO'CHORY (from Gk. *μύρμηξ, myrmēx*, ant + *χωρέω, chōreō*, I wander). A type of plant distribution in which the seeds or fruit are conveyed by ants. It was formerly supposed that the ants mistook the seeds for their own pupa and hence conveyed them to their nests. Further investigation has shown that certain oil bodies or elaiosomes attract the ants and are used by them for food. More than 150 species of European plants are known to have seeds possessing these bodies, and hence transported by ants. The record distance of transportation seems to be 20 to 70 meters, and a single colony of ants will convey many thousand seeds during the season.

MYR'MECOPH'ILY. See MYRMECOPHYTES.

MYRMECOPHYTES, mēr'mē-kō-fīts (from Gk. *μύρμηξ, myrmēx*, ant + *φυτόν, phyton*, plant), or MYRMECOPHILOUS PLANTS. Plants in which there are symbiotic relations between the plants and ants. Typical myrmecophytes are most commonly found in the tropics, and present peculiarities that are hard to explain in a purely scientific way. In some cases ants cut off leaves, take them to their nests, and raise crops of fungi that serve them as food. In other cases, as in the famous South American Cecropia, ants live in peculiar chambers within the plant, and feed upon products that appear to be useless so far as any other purpose is concerned. They appear, on the other hand, to defend the plants in which they dwell against leaf-cutting ants and other enemies. The relation here outlined is one of the most remarkable known types of symbiosis. The terms "myrmecophily" and "myrmecophilous" should be discarded for "myrmecophytism" and "myrmecophytic." See CECROPIA; MYRMECOCHORY; SYMBIOSIS.

MYRMID'ONES (Lat., from Gk. *Μυρμιδόνες*). In the *Iliad*, the Achæans of Phthiotis, in the south of Thessaly, ruled by King Peleus and led to the Trojan War by his son Achilles. Later writers discovered an eponymous hero, Myrmidon, son of Zeus and Eurymedusa and father of Actor, the husband of Ægina, daughter of Asopus, who was by Zeus the mother of Æacus. For Æacus Zeus changed the ants (*μύρμηκες, myrmēkes*) on the island of Ægina to men, when its people had died of a plague, and this race later wandered to Thessaly. The story is evidently due to the resemblance which the Greeks saw between the words "Myrmidones" and "myrmekes." Modern scholars have thought that the Myrmidones went from Thessaly to Ægina.

MYROB'ALAN (Lat. *myrobalanum*, from Gk. *μυροβάλανος, myrobalanos*, from *μύρον, myron*, unguent + *βάλανος, balanos*, acorn). The astringent fruit of certain species of Terminalia (family Combretaceæ), natives of the mountains of India. *Terminalia belerica* and *Terminalia chebula* produce most of the myrobalans of commerce, but the fruits of other species often appear. Formerly myrobalans were credited with tonic properties; now they are rarely used medicinally. They are largely exported for tanners' and dyers' use, since they give a durable yellow with alum and an excellent black with iron. A number of species are valuable for timber, the best known of which, *Terminalia catappa*, is a large deciduous tree planted in many tropical countries. It is a popular shade tree in Honolulu, where it is called Mexican almond from the almond-like flavor of the nuts.

MY'RON (Lat., from Gk. *Μύρων*). An Athenian sculptor, who flourished about the middle of the fifth century B.C. He was a native of Eleutheræ, near the Bœotian frontier of Attica, and is called a pupil of Hagelaïdas of Argos. In his style he belongs in the period of transition just before Phidias, but his works show also a remarkable power of observation and great technical skill. He was a worker primarily in bronze, and also skilled in the engraving of plate. No original work of his has survived, but late copies of some of his statues are extant. Of these the most famous is the Discobolus (q.v.), or discus thrower, of which there are specimens in the Vatican and the British Museum, though the best copy is in the Palazzo Lancellotti in Rome. (See illustration under GREEK ART.) Another work was a group on the Acropolis of Athens showing Marsyas preparing to pick up the flutes thrown away by Athena, but starting back at the approach of the goddess. A copy of the Marsyas is in the Lateran Museum in Rome. In antiquity a bronze cow on the Acropolis, made by Myron, was especially famed for its truth to nature. Many epigrams on his statue of the runner Ladas (q.v.) have also come down to us. Consult: Adolf Furtwängler, *Masterpieces of Greek Sculpture*, English translation by E. Sellers (New York, 1895); E. A. Gardner, *Six Greek Sculptors* (London, 1910); id., *A Handbook of Greek Sculpture* (ib., 1911); R. B. Richardson, *A History of Greek Sculpture* (New York, 1911); H. H. Powers, *The Message of Greek Art* (ib., 1913).

MYROSIN, mīr'ō-sīn. See DIGESTION IN PLANTS; ENZYME.

MYRRH, mûr. An umbelliferous plant. See CICELY.

MYRRH (AS. *myrre, myrra*, from Lat. *myrrha, murrha, murra*, from Gk. *μύρρα, myrrha*, myrrh, from Aram. *mūrā*, Heb. *mōr*, Ar. *murr*, myrrh, from Aram. *mārr*, Heb. *mārar*, Ar. *marra*, to be bitter). A gum resin produced by *Balsamodendron myrrha*, a tree of the natural order Amyridaceæ, growing in Arabia and in eastern Africa. The myrrh tree is small and scrubby, spiny, with whitish-gray bark, thinly scattered small leaves consisting of three obovate obtusely toothleted leaflets, and the fruit a smooth brown ovate drupe, somewhat larger than a pea. Myrrh exudes from the bark in oily yellowish drops, which gradually thicken and finally become hard, the color at the same time becoming darker. Myrrh appears in commerce either in tears and grains or in pieces of irregular form and various sizes, yellow, red, or reddish brown. It is brittle and has a waxy fracture, often exhibiting whitish veins. Its smell is balsamic, its taste aromatic and bitter. Myrrh and frankincense were commonly used by the ancients for fumigation. Myrrh is used in medicine as a tonic and stimulant, in disorders of the digestive organs, excessive secretions from the mucous membranes, etc., also to cleanse foul ulcers and promote their healing, and as a mouth wash and gargle, particularly in a spongy or ulcerated condition of the gums. The best myrrh is known as Turkey myrrh, being brought from Turkish ports. Most of the myrrh of commerce, however, passes either through Aden or through Bombay. The chief constituents of myrrh are a resin known as myrrhin, a gum, a volatile oil known as myrrhol and having the composition $C_{10}H_{14}O$, and a bitter principle. See GUMS.

MYRTA'CEÆ (Neo-Lat. nom. pl., from Lat.

myrtus, Gk. *μύρτος*, *myrtos*, myrtle, from Pers. *mūrd*, myrtle), or MYRTLE FAMILY. A family of dicotyledonous trees and shrubs. It is one of the large families of the order Myrtales, which with Umbellales culminates the dicotyledonous series called Archichlamydeæ. The whole order is characterized by perigynous or epigynous flowers and a strong tendency to develop four-parted flowers. The Myrtacæ include about 80 genera and 2800 species, well distributed through the tropics, but especially developed in South America and Australasia. Some of the species are gigantic trees, as the *Eucalyptus* or gum trees of Australia and certain species of *Metrosideros*. The timber is generally compact. Astringency seems to be characteristic of the family, and the leaves or other parts of some species are used in medicine for this property. A fragrant or pungent volatile oil is often present in considerable quantity, of which oil of cajeput and oil of cloves are examples. Cloves and pimento are among the best-known products of this family. The berries of several species are occasionally used as spices. A considerable number yield edible fruits, among which are the guava, species of the genus *Eugenia*, and some species of *Myrtus*. A remarkable pairing of genera occurs between South America and Australia, each continent having its own genera, many of them comprising hundreds of species. For example, *Eucalyptus* (200 species) and *Melaleuca* (100 species) belong to the Australasian region, while *Myrcia* (500 species) belongs to the American tropics. The largest genera with a general distribution are *Eugenia* (760 species) and *Myrtus* (100 species).

MYRTILUS, mēr′tĭ-lŭs. See HIPPODAMIA; ŒNOMAUS; PELOPS.

MYR′TLE (*Myrtus*). A genus of plants of the family Myrtaceæ. The common myrtle (*Myrtus communis*) is well known as a beautiful evergreen shrub, or a tree of moderate size, with white flowers. It is a native of the Mediterranean region and of the temperate parts of Asia. The leaves are astringent and aromatic, contain a volatile oil, and were used as a stimulant by the ancients. The berries are also aromatic, and are used in medicine in Greece and in India. A myrtle wine, called myrtidanum, is made in Tuscany. Myrtle bark is used for tanning in many parts of the south of Europe. Among the ancient Greeks the myrtle was sacred to Venus as the symbol of youth and beauty, and was much used in the festivals. It is often mentioned in poetry. The small-leaved myrtle (*Myrtus microphylla*) of Peru has red berries of the size of a pea, of a pleasant flavor and sugary sweetness. Those of the luma (*Myrtus luma*) are also palatable, and are eaten in Chile, as are those of *Myrtus ugni*, the Chilean guava, which is said to become a large tree with very hard and useful wood. These species have all been successfully grown in California as outdoor ornamental shrubs.

COMMON MYRTLE (*Myrtus communis*).

MYRTLE BIRD. The American yellow-rumped warbler (*Dendroica coronata*). It is about 5¾ inches long, bluish ash above, streaked with black; white below, with a black patch on the breast; crown, rump, and sides bright yellow, and the throat white. It is one of the most numerous and earliest of spring migrants in the United States, and scatters all over the country, but passes on to the north, and few breed south of the latitude of Lake Ontario. The name refers to the prevalence of this warbler in the Southern States in winter, where they feed on berries, especially those of the wax myrtle (*Myrica cerifera*). From the Rocky Mountains to the Pacific coast a very similar species (differing mainly in having the throat yellow) takes the place of the Eastern form; it is known as Audubon's warbler (*Dendroica auduboni*).

MYRTLE FAMILY. A popular name for the family Myrtaceæ (q.v.).

MYSIA, mĭsh′ĭ-ȧ (Lat., from Gk. *Μυσία*). In ancient geography, a district in the northwestern part of Asia Minor, bounded on the north by the Hellespont and the Propontis, on the east by Bithynia and Phrygia, on the south by Lydia, and on the west by the Ægean (Map: Greece, Ancient, E, F 2). Strictly, Mysia was the southeast part of this district. The principal rivers were the Granicus, Scamander, Caïcus, Æsepus, and Rhyndacus. The surface is mountainous in the interior, partly table-land; among the mountains are Ida in the west and Olympus in the north and east. The inhabitants were thought by some ancient writers to be of Thracian, and by others of Lydian, descent; probably there were immigrations from both countries. Mysia was subject to the Lydian monarchy, and under the Persian dominion formed, together with Lydia, one of the satrapies created by Darius. After the death of Alexander the Great it shared in the vicissitudes of Asia Minor during the wars of his successors and the Gallic invasion, but first assumed prominence in history with the rise in the third century B.C. of the Kingdom of Pergamum (q.v.). After 130 B.C. Mysia became part of the Roman province of Asia.

MYSLOWITZ, mĭs′lō-vĭts. A frontier town in the Province of Silesia, Prussia, on the Przemsa, 110 miles southeast of Breslau (Map: Prussia, H 3). It is at the point where the boundaries of Poland, Galician Austria, and Prussia meet. Coal mining, zinc refining, flax spinning, and brickmaking are its principal industries. Pop., 1900, 13,365; 1910, 17,838.

MYSOPHOBIA, mī′sō-fō′bĭ-ȧ. See INSANITY, *Borderland and Episodic States*.

MYSORE, mī-sōr′, or **MAISUR**, mī-sōōr′. One of the most important of the native states of India. It lies between lat. 11° 36′ and 15° 2′ N. and long. 74° 38′ and 78° 36′ E. (Map: India, C 7). Mysore is surrounded by British territory, almost all of which is the Madras Presidency; a portion of the southwest frontier is contiguous with Coorg and of the northwest with the Bombay Presidency. Its area is 29,475 square miles, being thus nearly as large as South Carolina and a little larger than the combined area of Vermont, New Hampshire, Massachusetts, and Rhode Island. The state lies between the Eastern and Western Ghat ranges in the form of a triangle, with the apex at the south in the group of the Nilgiris. It

is an undulating table-land, much broken by chains of rocky hills. The general elevation is about 2000 feet in the north and the south and about 3000 feet at the central water-parting which separates the Kistna and Cauvery basins. Most of the streams, none of which is navigable in Mysore, ultimately reach the Bay of Bengal. The state is naturally divided into two distinct regions—the hill country (Malnad) in the west and the larger, more open country (Maidan) in the east. The Malnad is a picturesque region of mountain and forest; the Maidan is better adapted to agriculture and more populous. Notable are the numerous isolated peaks, called *droogs*, which reach 4000 or 5000 feet. The highest point in Mysore is Mulainagiri (6317 feet), in the west, somewhat north of lat. 13°, in the Baba Bubans. There are three seasons—the rainy, from early June, with some interval in August and September, to mid-November; the cold, which is usually rainless, from mid-November to the end of February; and the hot, which is marked by occasional welcome thunderstorms, from March to the end of May. At Bangalore the temperature range in the rainy season is 64° to 84°; in the cold season, 51° to 80°; in the hot season, 66° to 91° or sometimes 96°. The annual rainfall varies from as little as 19 inches in the north central part of the state to as much as 360 inches on the crest of the Western Ghats.

An extensive system of irrigation is maintained by damming the streams so as to form reservoirs (tanks), from which the water is conducted in artificial channels. These tanks, varying from the size of a small pond to that of a large lake, number nearly 30,000. In general, however, the success of agriculture depends upon rainfall rather than impounded waters. Over 35 per cent of the total area is under cultivation, and less than one-sixth of the cultivated area is irrigated. By far the largest crop is raggee; this crop and rice and other food grains and pulses constitute the great bulk of agricultural produce. Other crops of importance are oil seeds, coffee, cotton, and sugar cane. About 66 per cent of the population is dependent upon agriculture.

The only mining of importance is that of gold. Upwards of 95 per cent of India's gold output is yielded by Mysore. In 1903 the output of the state was 598,769 ounces, valued at £2,283,999; in 1912, 561,065 ounces, £2,158,362. Gold is found chiefly in the Kolar district, in the extreme eastern part of the state. The manufactures include cottons, silks, carpets, ornaments of gold and silver, articles of copper and brass, pottery, articles in carved sandalwood, vegetable oil, leather, etc. A system of railways radiates from Bangalore; the length of railway open to traffic in Mysore is about 500 miles.

The population of Mysore, according to the census of March 10, 1911, was 5,806,193 (2,934,621 males, 2,871,572 females), showing an increase of 4.8 per cent over 1901. In 1871 the population was 5,055,102; in 1881, 4,186,188, the decrease being due largely to the great famine of 1876–78; in 1891, 4,943,604 (18.1 per cent increase); in 1901, 5,539,399 (increase 12.1 per cent). About three-fourths of the people speak Kanarese; about 15 per cent speak Telugu, chiefly in the Kolar district; about 4 per cent speak Tamil, which predominates at the Kolar gold fields; about 5 per cent speak Hindustani. In 1911 the unmarried numbered 1,597,180 males and 1,106,337 females; married, 1,197,404 and 1,205,726; widowed, 140,037 and 559,509. In respect of religion, the Hindus, of whom there are 72 castes, are vastly preponderant; the Lingayats constitute the strongest Hindu sect. In 1911 Hindus numbered 5,340,973; Mohammedans, 314,494; Christians, 59,844; Jains, 17,630; animists, 72,196. In 1901 Christians numbered 50,059. Of the Christians in 1911, 4902 males and 2561 females were of European race, 2673 and 3154 Eurasian, and 24,278 and 22,276 native; Roman Catholics numbered 42,543; Anglicans, 6656; Methodists, 3825; Baptists, 1269; and Presbyterians 1141. Of the total population, persons literate numbered 364,998 (328,816 males, 36,182 females), of whom persons literate in English were 40,641 (34,469 males, 6172 females). Since 1908 primary education has been gratuitous. In 1912 there were 2567 public schools and colleges and 1911 private schools, with a total enrollment of about 124,000 males and 25,000 females. A little over one-eighth of the population is urban. The largest cities are Bangalore and Mysore. Bangalore, including the adjoining British civil and military station, had, in 1901, 159,046 inhabitants, a decline, due chiefly to plague, of 11.8 per cent from 1891; in 1911, 189,485, an increase of 19.1 per cent. Bangalore City had in 1911 88,651 inhabitants (increase 27.7 per cent), and the civil and military station 100,834 (increase 12.5 per cent). The population of Mysore City was 68,111 in 1901 and 71,306 in 1911. Other large towns are Kolar, Tumkur, Channapatna, Davangere, and Tarikere.

The ruler of Mysore is the maharajah, in whose name and subject to whose sanction the administration is carried on by the divan, or Prime Minister, assisted by two councilors. The dynastic capital is Mysore City, but the higher offices of state are at Bangalore. The maharajah resides for a part of the year at each of these places. In 1907 a legislative council was formed, consisting of from 13 to 18 members. A representative assembly, elected by leading merchants, ryots, and local bodies, meets annually at Mysore for discussion and suggestion; it has no legislative powers. There is a chief court of justice consisting of three judges. The state comprises eight administrative districts (Bangalore, Kolar, Tumkur, Mysore, Hassan, Kadur, Shimoga, and Chitaldroog), each in charge of a deputy commissioner. The government of India is represented by a Resident. Revenue is derived chiefly from land tax, excise, forests, and mining leases.

History. Frequently mentioned in Hindu literature under the rule of various dynasties, the territory was merged with the Ballala Kingdom of Delhi after the Mohammedan invasion of the fourteenth century. After the overthrow of the Ballala rule by Ala ud Din, a new state arose, including Mysore and part of the Carnatic, with Vijayanagar as capital. In 1565 its ruler, Rajah Ram, was defeated and killed at the battle of Talikota by a Moslem confederation, and the state again became divided under the rule of several minor chiefs. One of these, Rajah Wodeyar, captured Seringapatam in 1610, and his successors strengthened their rule until, at the close of the seventeenth century, their sovereignty extended throughout Mysore. This dynasty was supplanted in the eighteenth century by Hyder Ali (q.v.), the formidable foe

to the rising British power in India. By the defeat and death of his son Tipu, Sultan at Seringapatam, in 1799, the state came under British control. Part of the territory was annexed to India, and a descendant of Wodeyar was appointed to rule over the remainder. Owing to misrule, the British took charge of the administration from 1831 to 1881.

Consult: Census Commission of India, *Census of India*, 1891, vol. xxv; 1903, vol. xxiv (Bangalore, 1893–1904); R. H. Elliot, *Gold, Sport, and Coffee Planting in Mysore* (London, 1894); Sir Roper Lethbridge, in *Imperial and Asiatic Quarterly Review, Third Series*, vols. xvii, xxiii (ib., 1904–07).

MYSORE, or **MAISUR** (buffalo town). The dynastic capital of Mysore state, India, and headquarters of Mysore district, in the southern part of the state and on the Mysore State Railway in lat. 12° 18′ N. and long. 76° 40′ E. (Map: India, C 7). It is situated in a valley at the northwest base of the temple-crowned Chamundi Hill, which rises 3489 feet above the sea. Formerly the old parts of the city were crowded and unsanitary, but conditions have been greatly ameliorated under the special improvement board formed in 1903. In recent years large extensions have been made to the north and west, increasing the area of the city from about 3 square miles to about 7½ square miles. In the new quarter have been erected many fine public buildings. In the wooded grounds of Gordon Park, on the high ground to the west, are the public offices, surmounted by a dome. In the vicinity are the Maharajah's College, the law courts, and the Victoria Jubilee Institute. The nucleus of the city is the fort, which is quadrangular, three of its sides being about 450 yards long and the remaining or south side somewhat longer. The chief of the numerous buildings within the fort is the maharajah's palace. As the old palace was partially destroyed by fire in 1897, it was decided to build a new palace of more modern design on the same site. The new palace is a decorative structure, embellished with porphyries and other ornamental stones and exhibiting interesting stone carvings done after the manner of the ancient sculptured temples of the region. The leading industry of Mysore is the manufacture of carpets. In 1891 the population was 74,048; in 1901, 68,111 (the decrease, due largely to plague, being 8 per cent); in 1911, 71,306 (increase 4.7 per cent).

Mysore is a place of great antiquity, having given its name to the surrounding country in the third century B.C., but few of the buildings existing to-day are more than one hundred years old. The original fort is said to have been constructed in 1524. Mysore was the ancestral capital of the state, but was superseded in 1610 by Seringapatam (10 miles to the northeast), which remained the seat of the court till the downfall of Tipu Sultan in 1799. Tipu had demolished the fort and palace, which were rebuilt upon the restoration of the Hindu rajah, and the court was removed to Mysore. The principal offices of state are at Bangalore, where the maharajah resides during part of the year.

MYSTACOCETI, mĭs′tă-kō-sē′tī. See CETACEA.

MYSTAGOGUE, mĭs′tă-gŏg (Lat. *mystagogus*, from Gk. *μυσταγωγός*, one who introduces into mysteries, from *μύστης*, *mystēs*, initiate, from *μυεῖν*, *myein*, to initiate, itself derived from *μύειν*, to close the eyes (or lips) + *ἀγωγός*, *agōgos*, leader, from *ἄγειν*, *agein*, to lead). In the Greek religious system, the functionary who directed the preparations of the candidates for initiation in the mysteries (q.v.). He had himself passed through all the grades of initiation, and was probably under the cognizance of the state. Prior to presenting himself for initiation, each votary had to place himself under the guidance of one of these mystagogues, and received instruction from him as to the various purifications and ceremonies to be performed. The mystagogue passed upon the fitness or unfitness of the applicant to receive the rites. In the Christian writers the term is used of the priest who prepared candidates for the sacraments of baptism, confirmation, and the Eucharist.

MYS'TERIES (Lat. *mysterium*, from Gk. *μυστήριον*, *mystērion*, from *μύστης*, *mystēs*, initiate; cf. MYSTAGOGUE). Secret rites connected with the Greek religion. They have been divided into two groups: (1) those in which the participants were a small circle of priests, officially connected with the sanctuary, and (2) those in which the participants were numerous. For a long time the view was prevalent that the mysteries concealed deep truths and the remnants of a primitive revelation too profound for the popular mind. The chief representative of this doctrine was G. F. Creuzer in his *Symbolik und Mythologie der alten Völker* (4 vols., Leipzig and Darmstadt, 1836–43). The deathblow to these theories, so far as critical scholarship was concerned, came from Lobeck, who in his *Aglaophamus* (Königsberg, 1829) showed that such occult wisdom was no part of their teaching. The most celebrated and reverenced were the Eleusinian mysteries, connected with the worship of Demeter (see CERES) and Cora (or Persephone) at Eleusis (q.v.) in Attica. (See ELEUSINIAN MYSTERIES.) With these goddesses there appear in the Eleusinian cult an anonymous god and goddess (*θεός*, *theos*, and *θεά*, *thea*), Pluto, Iacchus, Triptolemus, and Eubuleus, whose connection with the worship is by no means clear. The rites and legends connected with this cult are very similar to those prevailing not long ago among the European peasants, and point clearly to a similar belief in a grain spirit, which dies and is reborn yearly. So far as can be judged, the Eleusinian mysteries consisted largely in the rehearsal before the initiated (*μύσται*, *mystai*) of a sort of miracle play, or ritual drama, in which the rape of Cora, the sufferings of Demeter, and the final reunion of mother and daughter, together with the bestowal of the art of agriculture on man by Demeter, were represented in dramatic form. The initiation seems to have symbolized the redemption of the soul from the powers of the lower world and its reception by the goddess as pure. So far as can be learned from literature and art, the candidate was purified by a sacrifice which he himself brought, and, after fasting and preparation, wandered through a series of dark and confused passages, beset by terrifying sights and sounds, but emerging at last into the light, where he saw the goddesses. We know that candidates had to be initiated first into the Lesser Mysteries at Agræ, near Athens, six months before the ceremonies at Eleusis. The term "Mystæ" seems to include all the initiates, while those who

had been fully received are sometimes called *ἐπόπται, epoptai* (those who see). As to the public ceremonial we are better informed. The Lesser Mysteries were celebrated in the month Anthesterion (approximately February). They were accompanied, like the Greater Mysteries, by a sacred truce. The Greater Mysteries were celebrated in Boëdromion (approximately September) at Eleusis, though there was much preliminary ritual at Athens. On the 14th certain sacred relics (*τὰ ἱερά, ta hiera*) were brought from Eleusis to Athens and deposited in the Eleusinia; the next day seems to have been given to the gathering of the celebrants; on the 16th the Mystæ went in procession to the beach at Phalerum for solemn purification in the salt water; the 17th and 18th were filled with offerings and ceremonies at various sanctuaries in Athens; on the 19th, early in the day, the sacred procession escorted the image of Iacchus and the sacred relics to Eleusis. At the bridge over the Cephissus jests and gibes were exchanged, and it was evening (hence the 20th in Greek reckoning) when they arrived at the great sanctuary. The following nights and days were given up to the performance of the sacred ritual and the ceremonies of initiation, which certainly made a strong impression on the spectators. On the 23d the ceremonies closed with a solemn pouring out of water from two earthen jars towards the east and west. It is certain that no dogmatic teaching formed part of the Eleusinian worship; it is equally certain that those who were fully initiated into the mysteries had a stronger hope than others of a real life beyond the grave, and that in this further life they would enjoy the favor of Ceres. The chief officials connected with this sanctuary were the Hierophant (q.v.), who was always from the Eleusinian family of the Eumolpidæ, and from the family of the Kerykes the Dadouchos or torchbearer, the Hierokeryx or herald, and the priest at the altar. In connection with the celebration a sacred truce, extending from the full moon of the previous month to the tenth day of the following, was proclaimed so that the Mystæ could travel in security. Initiation was open to all ages and conditions, including even slaves, provided they were Hellenes (or later Romans) and were free from any great crime. Eleusinian mysteries were celebrated on a smaller scale at Phlius, Megalopolis, and elsewhere, while at Andania in Messenia they appear in combination with the Samothracian worship of the Cabeiri (q.v.).

Bibliography. C. A. Lobeck, *Aglaophamus* (2 vols., Königsberg, 1829), especially valuable for its collection of Greek and Roman passages bearing on the mysteries; Strube, *Bilderkreis von Eleusis* (Leipzig, 1870–72); Nebe, *De Mysteriorum Eleusiniorum Tempore et Administratione Publica* (Halle, 1886); Andrew Lang, *Myth, Ritual, and Religion* (London, 1887); E. A. Gardner, *New Chapters in Greek History* (ib., 1892); Theodor Mommsen, *Feste der Stadt Athen* (Leipzig, 1898); Foucart, *Recherches sur l'origine et la nature des mystères d'Eleusis* (Paris, 1895); id., *Les grands mystères d'Eleusis* (ib., 1900), very valuable, though the author's theory of the Egyptian origin of the mysteries is not generally accepted; L. R. Farnell, *Cults of the Greek States*, vol. iii (Oxford, 1906); T. G. Tucker, edition of the *Frogs* of Aristophanes (London, 1906); Arthur Fairbanks, *A Handbook of Greek Religion* (New York, 1910); J. E. Harrison, *Prolegomena to the Study of Greek Religion* (3d ed., Cambridge, 1908); and the works cited under ELEUSIS.

Next to the Eleusinian the most prominent were the Samothracian mysteries of the Cabeiri (q.v.). Originally these seem to have been two in number, though later we find two goddesses added, and the four, Axieros, Axiokersa, Axiokersos, and Kasmilos, were identified by the grammarians with Demeter, Persephone, Hades, and Hermes. The rites were believed to afford protection against the perils of the sea, and were doubtless in early times largely confined to seamen. Consult Conze, *Archäologische Untersuchungen auf Samothrake* (Vienna, 1875–80), and Preller-Robert, *Griechische Mythologie*, i. 2 (Berlin, 1894).

Another sanctuary of the Cabeiri lay near Thebes, where we find the deities worshiped as Cabiros and Pais (boy). The objects found seem to indicate that these mysteries were orgiastic in character. Consult *Athenische Mittheilungen des deutschen archäologischen Instituts*, vol. xiii and xv (Athens, 1888–90).

In the course of time other mysteries, such as those of Isis, Sabazios, Mithras, and other Oriental deities, spread through the Greek world, and at all times there were private sects, like the followers of Orpheus (q.v.), who professed to possess secret teachings which could insure peace and happiness in the other world to those who followed their directions here.

On the general subject of the mysteries, consult, in addition to the books named above: Petersen, *Der geheime Gottesdienst bei den Griechen* (Hamburg, 1848); Aurich, *Das antike Mysterienwesen in seinem Einfluss auf das Christentum* (Göttingen, 1894); Rohde, *Psyche* (3d ed., Leipzig, 1902); O. Gruppe, *Griechische Mythologie und Religionsgeschichte* (2 vols., Munich, 1906); W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. ii (Leipzig, 1890–97).

MYSTERIES OF UDOLPHO. A novel by Mrs. Ann Radcliffe (1794). This once popular romance tells of the castle of Udolpho in the Apennines, where terrific scenes of horror occur.

MYSTERY. The name given to a very early type of the mediæval drama, founded upon some part of the Bible narrative concerned with a mysterious subject, such as the incarnation or the resurrection, and in England often used indiscriminately with that of miracle play (q.v.). The traditions of the ancient drama survived to some extent the fall of the Western Empire, and on them were modeled religious plays, intended less for acting than for reading. There is extant a Greek play entitled Χριστὸς Πάσχων (The Passion of Christ), long attributed to St. Gregory Nazianzen, but now thought to be of much later date, which follows the structure of the ancient Greek drama. In the second half of the tenth century Hroswitha or Roswitha (q.v.), a Benedictine nun of Gandersheim in Saxony, wishing to provide her sisters with a substitute for Terence, who was widely read by the learned throughout the Middle Ages, cast six martyrdoms in the form of the old Latin comedy. Through imitations of this kind the classic drama may be said to have continued to exert some influence as late as 1200. But the main impetus to a revival of popular dramatic literature came from the Church. The clergy wished to provide some means of making the great events on which their teaching was

based more vivid and real to their unlettered flocks. This was the more natural because the service of the Church was in its very nature dramatic. Its chief act of worship was, in no abstruse sense, a representation of the sacrifice of Christ, and both the symbolism of the ritual and the responsive nature of the liturgy shared the same character. Especially at the great festivals of Christmas and Easter it was customary to make it still more dramatic by representing the events then commemorated as actually taking place before the congregation. Traces of this procedure are found as early as the closing years of the tenth century. The words used, the directions to the performers, hymns and anthems, were at first in Latin, but as dialogue was introduced they were naturally turned into the vernacular. In the thirteenth century, in fact, mysteries and miracle plays lost the favor of the Church. Having never been a part of the ritual they were gradually, for many reasons, banished from sacred buildings, and the clergy were forbidden to take part in them. They passed first to the churchyard and then to the streets and public squares, where they were performed on movable stages drawn from place to place. Performances of them were given also at court and in the houses of nobles. The actors in England were frequently members of the trade guilds, who arranged for these performances at Christmas, Easter, and Corpus Christi, supplemented by strolling players. In France they came under the control of the *Confréries de la Passion*, which were established in many of the leading towns—societies half religious, half literary, and wholly secularized by the fourteenth century. The plays devoted to the exposition of special mysteries were combined, in England at least, in an immense cycle, covering the entire range of the scriptural narrative from the Creation to the Day of Judgment. In texts belonging to the fourteenth, fifteenth, and sixteenth centuries four of these cycles, more or less complete, have come down to us. They are the York cycle (48 plays), the Towneley (32 plays), the Chester (25 plays), and the Coventry (42 plays); of other cycles there are fragments. The mystery plays died slowly as the regular drama came into existence. As late as 1580, we hear of one being represented at Coventry. The English actor-manager, Ben Greet, produced one of the fourteenth-century plays, *Everyman*—rather a morality than a mystery play, however—in England in 1903, and the following year in the United States.

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MYSTERY OF EDWIN DROOD. The last and unfinished novel by Charles Dickens. The first number appeared in 1870, and only six were finished when he died.

MYSTERY OF MARIE ROGET, mȧ'rē' rō'zhä'. A tale by Edgar A. Poe, published in three parts in *Snowden's Lady's Companion* (1842). It is a sequel to *Murders in the Rue Morgue*.

MYSTIC. A city in Apanoose Co., Iowa, 7 miles northwest of Centerville, on the Chicago, Milwaukee, and St. Paul Railroad (Map: Iowa, E 4). It is in a rich coal district, and coal mining is the chief industry. Pop., 1900, 1758; 1910, 2663.

MYSTIC HEXAGRAM. See HEXAGRAM, MYSTIC.

MYSTICISM, mĭs'tĭ-sĭz'm (from *mystic*, from Lat. *mysticus*, from Gk. *μυστικός*, *mystikos*, relating to mysteries, from *μύστης*, *mystēs*, initiate). A term used in so many senses that it is not easy to define. Two types of definition are found—one which defines mysticism as an experience which assumes to give immediate knowledge of an external Power, without the mediation of history or reason; the other definition would only add to this the emphasis on feeling. It defines mysticism as the sense of union with the Supreme, verified by feeling. The basis of mysticism is in the exaltation of the automatic and passive states and the diminution of the active and individual. Such a state may result in a merely passive reception of any passing impressions or in a wild riot of uncontrolled emotions. In any case the person is carried "out of himself" and is easily led to put a supernatural interpretation upon his experiences. He often regards his feelings as the source of knowledge not otherwise obtainable and is tempted to look upon himself as being favored with a special revelation from divine powers. Mystic feeling, however, need not be religiously interpreted. Music, drugs, the contemplation of nature, and many other experiences may induce the feeling. Even in savage life, however, these feelings begin to be connected with religion. The shaman of Central Asia, the American Indian medicine man, and the emotional religious dances of most savage tribes are examples. In most of the higher religions, persons of the mystic temperament have used the religion to explain their experiences. Religious mysticism exhibits two wholly different qualities, curiously combined, viz., pure individualism and the sinking of personality. The mystic may have fervently striven to attain the exalted state of communion with God, yet, when once it has been reached, conscious activity ceases, and through a sort of passive rapture the subject seems merged in the object

of his yearning. Direct intuition supersedes reason. Mysticism tends to be independent of external authorities, whether of rite, creed, priesthood, or Scripture.

In races which have developed a philosophy, mystic experiences have naturally been subjected to a philosophical explanation. Since the feeling is interpreted as one of union with the Supreme, the philosophy identifies the soul of man with the supreme soul of the universe, whether it calls the Supreme God or gives it some other name. This philosophy tends also to identify all other things, so far as they have reality, with the Supreme, i.e., it tends to become pantheistic. It is often accompanied by a belief that the existence of the visible universe is merely apparent, not real. The most thorough and consistent philosophical mysticism is that of Hindu philosophy, especially the Vedantic school. (See VEDANTA.) This holds that the only reality in the universe is a Supreme, Brahm, of which man is one manifestation, and the sense of personal individuality is illusion. Probably the most complete discipline of mystic practice, to induce the feeling of union with the Supreme and the loss of individuality, is the Hindu yoga. The philosophy, and to some extent the yoga practice, was borrowed by northern Buddhism and carried into Tibet and Japan. In China, Confucianism was antimystical, but Taoism contained mystic elements. Greece had mysticism in the religious mysteries which became popular in her later days, and Neoplatonism was grounded, both as a philosophy and as a religion, in mysticism. The Moslem Sufis of Persia were pantheistic mystics, the roots of their system probably going back to Hindu philosophy. Sufism is noteworthy as giving the best literary expression to mysticism in the symbolic poetry of Hafiz, Rumi (qq.v.), and others. Slight traces of mysticism appear in the New Testament, especially in John, but Christian mysticism as a system is derived from Neoplatonism through the writings of pseudo-Dionysius Areopagita (see DIONYSIUS THE AREOPAGITE) and his great commentator, Maximus Confessor (seventh century). John Scotus Erigena (ninth century) translated the pseudo-Dionysius into Latin, and thus introduced Greek mystical theology in western Europe, where, superimposed upon the mysticism of St. Augustine, it enjoyed increasing popularity. The most flourishing period of Christian mysticism was in the Middle Ages and just previous to the Reformation. Monasticism proved a congenial soil for the cultivation of the mystic spirit, and some of its most perfect types are found among the monks, e.g., in the Eastern Church the Hesychastæ of Mount Athos (see HESYCHASTS) and, in the Western, Bernard of Clairvaux, Francis of Assisi, and Ignatius of Loyola. The monastery of St. Victor, near Paris, was a very influential centre of mysticism in the twelfth century. Several famous mystics appear among the Schoolmen, e.g., Bonaventura, a disciple of the Victorines. Amalric of Bène, a Paris doctor (died 1207), pushed his mysticism to a pantheistic extreme.

Among the Dutch mystics are Ruysbroeck, author of several spiritual tracts (died 1381), Gerhardt Groot, founder of the Brethren of the Common Life (q.v.) (died 1384), and Thomas à Kempis, author of the *Imitation of Christ* (died 1471). Eckhardt (died c.1327) stands in the front rank of German mystics, and among his disciples were Tauler (died 1361) and Suso of Constance (died 1366). The *German Theology*, a popular book of devotion, which strongly influenced Luther, was published by him in 1517 (Eng. trans., 3d ed., New York, 1901). Jakob Böhme (died 1624) belongs to the Protestant school. Certain Protestant sects made mystic elements prominent, as some branches of the Anabaptists and the Friends. Few Protestant churches, however, have been wholly without representations of mysticism. Even in New England, Jonathan Edwards showed a strong mystic strain, and the revivals which began in his time and spread over the land for the next century gained much of their power from the assumption of mystic principles, laying great stress on feeling as a revelation of the will of God, but not leading to the pantheism of philosophic mysticism. Among more recent German mystics are Novalis, the disciple of Romanticism (died 1801). In England we find George Fox (died 1690). Among his contemporaries the Cambridge Platonists (q.v.), especially Cudworth, More, and Smith, were both rationalistic and mystical; George Herbert (died 1633), Francis Quarles (died 1644), Henry Vaughan (died 1695), and later William Law (died 1761) were purely mystical. What is known as Quietism (q.v.) was a movement of the same nature with whose earlier stages St. Francis of Sales, Bishop of Geneva (died 1622), had some sympathy, and which the Spaniard Molinos (died 1696), Fénelon (died 1715), and especially Madame Guyon (died 1717) made more definite. Not a few of the most gifted and honored among mystics have been women, e.g., St. Hildegarde (died 1178), Elizabeth of Schönau (died 1164), St. Catharine of Siena (died 1380), and St. Theresa (died 1582).

In whatever religion it appears, mysticism is always essentially the same. Identical mystic experiences are used as a proof of the truth of Hinduism, Mohammedanism, and Christianity alike. The modern studies of the history and the psychology of religion have made it possible to understand the character of mystic experiences and to see that, while real religious experiences, they offer no objective evidence for any system of religion. The estimate of the religious value of mysticism differs greatly, some holding it to be the very essence of religion, and others regarding its influence as of very doubtful worth.

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MYSTIC SHRINE, Ancient Arabic Order of Nobles of the. An order asserted to have been founded at Mecca, Arabia, in the year of the Hejira 25. The modern order is of comparatively recent origin. The governing body in America is the Imperial Council, with 101 subordinate branches, called Temples. The order is not a Masonic body, but only Masons of the thirty-second degree of the Ancient and Accepted Scottish Rite, or Knights Templars in good standing, are eligible for admission. The membership in America amounts to about 200,500. See Masons.

MYSZ-GMEINER, mēs'-g'mī'ner, Lula (1876–). An Hungarian dramatic contralto, born at Kronstadt. At six she took up the study of the violin, at 16 she was receiving vocal instruction from Lassel in her native city, and later she studied at Vienna under Gustav Walter and other famous teachers. After 1896 she visited all the large cities of Austria-Hungary, Germany, Switzerland, Holland, Russia, Belgium, and France; also London, Madrid, and Bucharest. In 1900 she was married to Ernst Mysz, an Austro-Hungarian naval officer.

MYTH (Lat. *mythos*, from Gk. *μῦθος*, speech, legend). A form of folklore (q.v.) which sets forth as an historic tale the processes of nature or beliefs concerning cosmogony (q.v.), religion (q.v.), custom (q.v.), tradition, and the like. The sum total of myths is the material for the science of mythology (q.v.), frequently termed comparative mythology. Within this many subdivisions may be set off, as the Greek myths concerning Diana (q.v.), the Teutonic Valhalla myths (see Valhalla), the Polynesian water myths, or the Hindu myths regarding caste (q.v.). Myth is sometimes distinguished carefully from fable (q.v.) and from legend (q.v.). Thus, we may have the fable of Zeus and the frogs, which points a moral teaching, or the legend of St. Christopher (q.v.), which narrates a miraculous event which may or may not have a moral bearing; but the Zeus myth (see Jupiter) is based on belief in a sky god and is thus a part of nature worship (q.v.). Ethnologists, however, attach relatively little importance to the distinction, since precisely the same tale that is told by one tribe as a purely literary form of amusement may acquire a sacred, or at least serious, aspect among a neighboring people through association with an important supernatural being or religious ceremony.

MYTHICAL ISLANDS. Fabulous lands, with which popular lore or the imagination of poets and travelers have, since the earliest times, peopled various parts of the ocean. Among the Greeks the Islands of the Blessed (q.v.), lying far in the western ocean, were the homes of those whom the divine favor saved from the pains of death to live in eternal bliss. Later Plato placed in the same part of the world his lost Atlantis (q.v.). Celtic mythology presents a counterpart of the Islands of the Blessed in the fairyland of Avalon (q.v.), where Arthur was carried after his last battle. Of Celtic origin, too, is the mythical land of St. Brendan (see Brendan, or Brenainn), lying off the western coast of Africa, in search of which expeditions set out as late as the beginning of the eighteenth century. To Christian refugees from the Iberian Peninsula, at the time of the Mohammedan invasion, legend ascribed the settlement of the long-sought-for Island of the Seven Cities (q.v.). More within the realm of fact is Marco Polo's Cipango, identified by some with Japan. The Age of Discovery was fruitful of legendary lands, cities, and islands. Best known among these last were the island of Bimini, in the region of the Bahamas, containing the fountain of youth, and the island of Brazil, which owed its name to its precious dyestuffs.

MYTHO. See Mito.

MYTHOL'OGY (Lat. *mythologia*, from Gk. *μυθολογία*, from *μῦθος*, *mythos*, myth + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). The science of myths, either a body of more or less doubtful stories, as when we speak of Greek or German mythology, or a rational account of how all such stories originate. Every race has its own myths, and in the first sense of the word a mythology has only to enumerate and classify the special stories of each race. The second application of the term, however, comprises various theories put forward to explain myths. Thus, we come to what is now called the science of mythology, which deals with the origins of such myths or popular stories.

Myths may be divided into two sets of categories, arranged either according to the intellectual status of the original myth makers or according to the subject matter of the myth itself. Thus, we may have myths of savages, as opposed to myths of cultivated races, and we may have myths of cosmogony, as opposed to myths of heroes. In many discussions of mythology it seems to be assumed that the so-called savage myths treated of the same subjects as do the higher myths, only in a less cultivated manner; but this is an error. Hero myths are sometimes called legends, to distinguish them from cosmogonic myths.

Classification of Myths. The first important fact in mythology is that, however much we use the word "mythology" as if it were especially concerned with gods, no sharp line of demarcation can be drawn among primitive races between such myths and the folk tales dealing with human events. The same plot is now associated with a divine person and again with a human hero. Similarly, it will not do to separate philosophical tales purporting to explain the origin of man and natural phenomena from stories that serve merely to amuse; for often in the same tribe the same story is told with and without the explanatory feature, which is now recognized as secondary, especially by American ethnologists. It is customary to divide myths into historical and scientific, i.e., myths of the past of man and myths to explain natural phenomena. But among the most primitive peoples the two sorts of myths become one. A vague tradition of the wanderings of a tribe is simply united with an explanation of a physical process, and thus the scientific myth is also historical. Mythology has to do with religion only because religion is one of the many fields in which the art of telling stories has exercised itself. It does not follow, however, that a story in regard to the flood or to the way the world was made has any religious significance. The

former example is a very good illustration of how the historical myth may become a religious myth. Thus, in India the story of the deluge was told at first without any suggestion that the flood was a punishment of sin; later, however, it is interpreted as a washing out of sin.

Another important principle in the classification of myths is the relativity of imagination in the myth makers. This disposes of the rather crude demarcation into savage and higher myths. Thus, the Polynesian and Melanesian mythology is almost as rich in stories of the gods as is that of Homer, but for all that some of the island blacks are as savage as those of Africa, and their higher mythology merely means that these savages are more imaginative than are the Mishmis and Kacharis of India, who have an active fear of devils and a very vague idea of any other spiritual power except the ancestral ghost. An excellent illustration of mythology in its lowest stages is offered by the Central Australians. Here the whole burden of myths is concerned with the great deeds of the ancestors in the holy *Alcheringa*, or "time of old." Of real gods there is only a Creator whose cosmogonic work is briefly described as "cutting out the world." The Creator made the world and the half-human ancestors of the tribes, but the mythology is concerned only with the latter. Gods, and especially tales of gods, come much later. If we may conclude that ancestor deeds, and a somewhat adventitious and remote scientific explanation of the universe as formed by a superior being or as consisting of such a being's dismembered parts (another popular savage myth), constitute the basis of mythology, we shall no less truly find that the doings of the demons constitute the next stage. This phase of mythology is usually not developed beyond simple concrete performances. There is very little mysticism, and no system. A certain devil has had a difficulty with some member of the tribe and is either driven off or slays the man, who then becomes a devil in turn. A further stage is reached as the devil becomes more godlike, i.e., is no longer a mere mischief-maker, but a helper of man. This stage may be reached by savages, and it is characteristic of Polynesian mythology that, while mainly concerned with the doings of demons, it rises also to the conception of a kind-hearted demon, although this happens seldom.

At the stage when demons and not gods are the controlling spiritual agency, we find animal myths in their crudest form, often, as in totemic tribes, being identical with ancestor-myths, but, again, without such identification. Thus, when the tribe is descended from an animal ancestor, or the ancestor has become an animal, the two sorts of myths merge; but myths about animals may be current without any notion of relationship between man and animal. The same is true in regard to myths about animated trees and mountains, etc. It is quite impossible to draw a sharp line between this stage and that where demons and animals and cult-heroes are elevated to the position of gods, and tales about them become part of theology.

In general we must distinguish between ancestor and cosmogonic myths, the myths of devils and of sprites, and the myths that collect about higher anthropopathic divinities. Again, not exactly cosmogonic, but quasi-historical, are the myths of floods and wanderings and of early settlements reflected in tales of hyperborean paradises. As the cosmogonic myths are early attempts to give not a religious, but a scientific or at least a logical explanation of the universe, so this class of myths may be called historical, since they are so in form and are so interpreted by the people among whom they are current. The utmost caution must be exercised in attaching any historical value to oral tradition; it seems an established principle that the memory of primitive tribes cannot be safely trusted as to events dating back much more than a century. If there is extraneous evidence that tallies with the myth, the myth is, from the historian's point of view, superfluous; if there is not, it should simply be disregarded for any purpose but that of studying native psychology. In the frequent amalgamation of tribes into a larger political unit myths often lose their original significance and are attached to quite different gods. Even without visible outward change the hero-god becomes modified in spirit, according to the changing theology. Again, as tribes merge and distribute their myths, so myths by their own charm travel from land to land, the characters being changed. Myths in an advanced stage may become purely allegorical, as when a solar culture-hero is represented as destroying barbarism under the guise of a long anthropomorphic tale, such as the epic of the Ramayana in India. Again, in the process of anthropomorphizing, the hero may become so human as to suggest that he was a man, and we thus arrive at the Euhemeristic explanation of all myths as tales told about human beings afterwards elevated to divine rank. Thus, in India the "mortal gods," or gods who had originally been men, are a recognized class, the most conspicuous member of the class being the local Crœsus called Kubera, who is usually regarded as king of the under-world wealth, a Pluto; but in this interpretation he is a god divinized out of a rich man named Kubera.

Explanation of Myths. The example just cited (and analogous cases) led to the notion that all myths were to be interpreted in this way, a view held by some rationalists in India, and favored in Greece by many thinkers, but first reduced to an "atheistic" philosophy of mythology by Euhemerus in the fourth century B.C. In opposition to the older view that myths were to be interpreted allegorically, Euhemerus taught—whether seriously or not is now questioned by some scholars—that the gods were originally men, and that stories about men were transferred to gods, a method here and there countenanced by Plato. Herbert Spencer, who also believes that gods were at first the ghosts of men, has adopted the Euhemeristic explanation in its crudest form. He believes, for example, that there was once a girl called Dawn, and that when she died the Vedic Aryans sang to her ghost the Vedic "hymns to Dawn"—a view consonant neither with the content of the hymns nor with the practices of the poets. At present, if we pass by Spencer's theory with the brief criticism it deserves, there are two accepted schools of interpretation. The older view is that of Max Müller. In its whole form it is quite as unhistorical as Spencer's, but it contains a truth ignored by the opposing school. Müller held that myths were nature poetry, and that many of them in an advanced stage of evolution could be explained by what he called "disease of language," that is, mythology is the result of the misunderstanding, on the part of

a whole people, of their inherited phraseology. Where an old poet referred to sunrise as "the shining one" (feminine) being followed by "the bright one" (masculine), his descendants interpreted the grammatical sex as implying sex in person, and his phrase meant to them "the (male god) Bright (sun) courts Miss Dawn," and so, on the strength of countless errors of this sort, arose mythology, which can be analyzed into its component parts by comparing the names of gods in one language with cognate words in related languages. Müller's error lies in a too sweeping application of this theory, in his lack of appreciation of other causes leading to mythology, and in the weakness of his etymologies. But there is truth in the dictum that a misapprehension makes gods. A Vedic poet sings, "Who is the god whom we should revere?" and his sublime word is interpreted by a later generation as meaning "there is a god called Who, and we should make sacrifice to Who." Then later writers go still further and enjoin upon the priests to make two sets of offerings, one to Who and one to Whom, as distinct deities. The folklore explanation, which has obtained since Mannhardt and Tylor and is steadily gaining ground, rejects both Euhemerism and language disease as factors of mythology, and seeks the explanation of the higher myth in the original conception of the lower. Kronos's brutality and *Little Red Riding Hood* are both stories popular in their day and paralleled by many like stories among savage nations to-day. Such tales are retained, toned down, symbolically explained, but in origin they belong to the tales that please savages. There is no doubt that such is the state of the case, and that *Red Riding Hood* is not a sun myth (exposed to disease of language), but a tale that pleasantly affected peasants. The folklore explanation runs to accumulation of tales, however, without a radical explanation, and it ignores too much what is true in Spencer's mythology, that many tales are simply ghost stories. Nor can it be said that the folklore method is successful in explaining all myths. It is an error to suppose that all myths are psychical reflections of physical or of meteorological phenomena, for much must be attributed, even among savages, to poetical fancy. But what Mannhardt has himself called "nature poetry" and illustrated by modern examples among the Slavs shows that personalities originally solar are sometimes transferred to poetical representatives explicable only in a solar light. The true explanation of mythology will combine the hitherto antagonistic explanations of Lang and Müller, and will also admit that Spencer's theory of ghost mythology is at times applicable. No stereotyped formula can include all the phenomena. In the last analysis will be found folklore, language change, and ghost stories. All three principles are active to-day in India, and probably have always been active among all peoples in proportion to their imaginative powers. The fourth element of poetic fancy affects all the other three. Much that is looked upon as elaborated mythology is nothing but a naïve statement of what appears to the savage as everyday facts, such as the birth of men from beasts or from the elements, the birth of animals from women, metempsychosis, the intimate relations between man and all natural objects. For the mythology of American Indians see INDIANS, AMERICAN. See also AFRICA, *Ethnology;* EGYPT, *Ancient Religion;* GREEK RELIGION; INDIA, *Religion;* INDIAN MYTHOLOGY; SCANDINAVIAN MYTHOLOGY; SLAVIC MYTHOLOGY.

Bibliography. A summary of all theoretical views on mythology is given by Wilhelm Wundt, *Mythus und Religion* (3 vols., Leipzig, 1905–08). For a brief general introduction from the ethnologist's point of view, consult Paul Ehrenreich, *Die allgemeine Mythologie und ihre ethnologischen Grundlagen* (Leipzig, 1910), and Arnold Van Gennep, *La formation des légendes* (Paris, 1910). For the folklore theory, consult E. B. Tylor, *Primitive Culture* (2d ed., 2 vols., London, 1873); E. H. Meyer, *Indogermanische Mythen* (Berlin, 1883); W. Mannhardt, *Mythologische Forschungen* (Strassburg, 1884); Andrew Lang, *Custom and Myth* (London, 1884); id., *The Making of Religion* (ib., 1898); id., *Myth, Ritual, and Religion* (2d ed., ib., 1899); John Fiske, *Myths and Myth-Makers* (New York, 1900); C. F. Keary, *The Dawn of History: an Introduction to Prehistoric Study* (new ed., ib., 1902); J. G. Frazer, *The Golden Bough* (3d ed., New York, 1907–13). For the comparative school, Kuhn, *Herabkunft des Feuers und des Göttertranks* (Berlin, 1859); Schrader, *Sprachvergleichung und Urgeschichte* (2d ed., Jena, 1890); Max Müller, *Contributions to the Science of Mythology* (2 vols., London, 1897); G. W. Cox, *Mythology of the Aryan Nations* (New York, 1903). The ghost theory is given in Herbert Spencer's *Principles of Sociology* (3 vols., New York, 1900–01). For the modern point of view on "historical myths," consult Sidney Hartland, "On the Evidential Value of the Historical Traditions of the Bagunda and Bushongo," *Folk-Lore* (London, 1914). Special mythologies are treated by J. Dowson, *A Classical Dictionary of Hindu Mythology* (London, 1878); Alfred Hillebrandt, *Vedische Mythologie* (Breslau, 1891); Hermann Oldenberg, *Die Religion des Veda* (Berlin, 1894); E. W. Hopkins, *Religions of India* (Boston, 1895); P. L. Renouf, *Religion of Ancient Egypt* (London, 1880); Morris Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898); G. A. Barton, *Sketch of Semitic Origins* (New York, 1902); Ludwig Preller, *Griechische Mythologie* (4th ed., Berlin, 1894); P. O. Gruppe, *Griechische Mythologie und Religions-geschichte* (Munich, 1898); Georg Wissowa, *Religion und Cultus der Römer* (ib., 1898); R. B. Anderson, *Norse Mythology* (5th ed., Chicago, 1889; Norweg. trans., 1887); Victor Rydberg, *Teutonic Mythology;* translated by R. B. Anderson, (2 vols., London, 1889); P. D. Chantepie de la Saussaye, *Religionsgeschichte* (3d ed., Freiburg, 1905); id., *Religion of the Teutons* (Boston, 1903); W. W. Gill, *Myths and Songs from the South Pacific* (London, 1876); D. G. Brinton, *Religion of Primitive Peoples* (New York, 1897); C. Squire, *Mythology of the British Islands* (London, 1905); Lowie, "The Test-Theme in North American Mythology," *Journal of American Folk-Lore* (Boston, 1908); Waterman, "The Explanatory Element in the Folk-Tales of the North American Indians," in *Journal of American Folk-Lore* (ib., 1914).

MYTHOLOGY IN ART. That portion of art which is concerned with the representation of mythological concepts. Religious notions are symbolized at a very early stage in the history of mankind; indeed, they form, generally speaking, the most important subject of ancient art.

Conceptions which can be given in vague and poetic terms in the literature must of necessity in art be represented concretely. The first beginnings are rude and uncouth; yet they develop in the course of time into the most beautiful of all expressions of national art. They are thus important not only from the point of view of history of art, but as one of the main sources for an accurate knowledge of the history of religion. We may trace in them also in many cases the influence which one religion has exercised upon another. If, e.g., we find the bearded figure within a circle as the Iranian symbol of Ormazd, and in Assyrian sculpture see the same figure hovering over a field of battle, it is at once evident that the religious art of Assyria has influenced that of ancient Persia, and the implication follows that the actual concept of the deity of Ormazd has been modified by a Semitic deity.

Nowhere are the distinct national characteristics of mythology so clearly set forth as in art. In the Egyptian paintings and statues of deities we have the stiff outlines and the grotesque animal-headed figures, which stand in marked contrast to the brutal and massive religious art of Assyria and Babylonia. From the point of view of comparative religion the most perfect productions of art are as a rule inferior to the rude and archaic. It might almost be laid down as a rule that the higher the artistic merit, the less the purely religious value. The most important contributions of Assyrian art to a knowledge of its mythology are to be found, not in the finished productions of the late period, but in the more ancient seal cylinders, whose purely artistic merit is often slight. In Greece, in like manner, the early religious art is rude, but here we find in the most archaic periods traces of influence from Egypt, or again, as in certain pictures of the struggle of Hercules with the Nemean lion, an analogue too close to be accidental with Babylonian pictures of the Gilgamish cycle. Though the highest religious sentiments of a people at a given period are embodied in its art, the endeavor to make this embodiment perfect tends in the course of time to an increased purity in the type and symbolization of religious concept. This interacting process is stimulated by the fact that the statue or the painting is conceived to be in itself divine, and at a later period a portion of godhood; later still it is a symbol which may indeed be a god to the vulgar, but to the cultured or to the initiated is but a representation of divinity. Artistic conceptions of divinities naturally vary according to the character of the god represented. Thus, in ancient Mexico we find beside the figure of the beneficent Quetzalcoatl the horrible statue of the war god Huitzilopochtli, on whose altar human sacrifices were offered. In India, as well as in Mexico, in harmony with the grotesque religious legends, we find strange divine figures. The monkey god Hanuman, in harmony with his energetic character, has no touch of the effeminate about him, as has the love god Kama; and in like manner we find the voluptuous figure of Parvati, the wife of Siva, in her kindly aspect, beside the frightful and demoniac figure of Durga, the malignant form of the same goddess. In Greece, where mythology in art was developed to its utmost perfection, we find this principle carried out in its entirety. Beside the austere Athene stands the seductive Aphrodite; with the powerful Hercules is contrasted the delicate, almost too beautiful Apollo; and over all the Pantheon towers the majestic figure of Zeus. See ART, *History;* the various articles on National Art; and, for illustrations, the plates of EGYPTIAN DEITIES; HINDU DEITIES under INDIA; GREEK ART; JUPITER; LYSIPPUS; PARTHENON.

MYTILENE, mĭt'ĭ-lē'nē (Lat., from Gk. Μυτιλήνη, Turk. *Midillü*), or MITYLENE. The largest island in the Ægean Sea, also known as Lesbos (q.v.) (Map: Balkan Peninsula, F 5).

MYTILENE, or **MITYLENE** (modern Kastro, q.v., or Mitjlini). The capital of the island of Lesbos (q.v.). It was colonized in very ancient times by the Æolians. Its situation on the southeast coast of Lesbos on a promontory gave it two excellent harbors (Map: Turkey in Europe, F 5). It is famous as the birthplace of Sappho and Theophrastus, among others. Of its internal political history down to the time when Pittacus became practically dictator early in the sixth century B.C., something is to be learned from the fragments of the poetry of Alcæus (q.v.). Meanwhile the city had become the most important centre of the Asiatic Æolians and a great naval power, and had founded colonies in Mysia and in Thrace. After the Persian wars it became an important member of the Athenian Confederacy, but in 428 B.C., the fourth year of the Peloponnesian War, it rebelled against Athenian domination. Defeat after a famous struggle ended its power (427 B.C.). Mytilene fought on the side of King Mithridates in his war against Rome (88 B.C.), and after his defeat suffered for it. Very little of the ancient town remains. Perhaps the most important edifice is the Greek College, an institution which Greek boys of the entire Ægean coast attend. Consult Leithäuser, *Der Abfall Mytilenes von Athens* (Leipzig, 1874), and C. Cichorius, *Rom und Mytilene* (ib., 1888).

MYTILUS. See MUSSEL.

MYXINE, mĭks-ī'nē (from Gk. μύξα, *myxa*, mucus). The single genus of the family Myxinidæ, represented by the single species *Myxine glutinosa*, the hagfish or borer of the North Atlantic coast. These eel-shaped parasitic animals, which burrow into the bodies of fishes, are extraordinary in their reproductive habits. According to Nansen, *Myxine* is generally or always in its young stage a male, while at a more advanced stage it becomes transformed into a female. The ovary is single and on the right side, and there are no oviducts, the mature eggs falling into the abdominal cavity and being extruded through the peritoneal opening at the side of the vent. The eggs are few and large, and each is inclosed in an oblong horny case, with threads at each end, by which the egg adheres to some fixed object until it hatches. See HAGFISH; and Plate of LAMPREYS AND DOGFISH.

EGG OF MYXINE.

MYXOBACTERIACEÆ, mĭks'ō-băk-tē'rĭ-ā'-sē-ē (Neo-Gk. nom. pl., from Gk. μύξα, *myxa*, mucus, slime + Gk. βακτήρια, *bakteria*, little rods. See BACTERIA, first paragraph). A group of organisms evidently related to the bacteria, but distinguished from them by a remarkably complex colony organization. The individual cells resemble those of bacteria, but

they are combined in structures of definite and even elaborate form. The name suggests a combination of the characters of the slime molds (Myxomycetes, q.v.) and bacteria, the individual cells resembling the latter, and the cells coming together to form a complex body, as the plasmodium of the slime molds is formed.

MYX'ŒDE'MA (Neo-Lat. nom. pl., from *μύξα, myxa*, mucus + *οἴδημα, oidēma*, swelling). A progressive disease, characterized by widespread changes in nutrition and by the invasion of the subcutaneous tissues by solid œdema, dependent on diminished functional activity of the thyroid gland. It has been called *cachexie pachydermique* (Charcot), *cachexia thyroidea* (Kocher), and *hydroparesie* (Féris). Myxœdema is caused by atrophy or destruction of the thyroid gland by disease or as a result of removal of it by operation. When a sequel of thyroid removal it is called *cachexia strumipriva*. It is observed principally in women (in the proportion of 7 to 1) and is, in fact, an acquired cretinism in adult life. By far the greater number of cases occur between the ages of 35 and 45. In some families there is a distinct inheritance of a predisposition to disease of the thyroid gland. Hereditary syphilis may be a factor. The malady is seen most frequently in cold climates and is perhaps most frequent in Europe. It is rare in the tropics. The symptoms develop gradually, in most cases nearly a year elapsing before the disease becomes distinct. Among the principal symptoms are languor or indolence, absence of perspiration, loss of hair, decay of nails and teeth, a stiff gait, a thickening of the skin and of the mucous membrane of the nose, pallor, subnormal temperature, hallucinations of sight and hearing, many mental abnormalities, and even actual insanity. Incomplete myxœdema (*myxœdeme fruste*) is a state in which the symptoms are less marked or have ceased to develop. The treatment consists in feeding the patient with thyroid-gland extract or dried gland, together with tonics, such as phosphoric acid and iron. Thyroid grafting has proved efficacious, temporarily at least, in many patients. A part or the entire thyroid of an animal is transplanted into the peritoneal cavity or subcutaneous tissue of the patient, to whom the gland has been fed for some time previously, as suggested by Victor Horsley. Thyroid gland was first administered by Murray in 1891. Before the thyroid treatment was known the prognosis in myxœdema was uniformly bad, the patient dying in from 5 to 7 years, generally from some intercurrent disease. Under thyroid treatment mild cases can be cured, and in severe cases the symptoms controlled almost indefinitely. The symptoms disappear one by one with astonishing rapidity, and the transformation in the patient's appearance is one of the most remarkable phenomena in medicine. The gland, generally that of a sheep, must, however, be given with great care, degeneration of the heart or of the great vessels being an indication for very small initial dosage. In some patients profuse diarrhœa results, in others vomiting, sweating, headache, swelling of the glands about the jaw, and prostration. The remedy may be used hypodermically. After the symptoms of the disease have disappeared the patient must take a small quantity of the thyroid extract at regular intervals as long as she lives, to maintain the improved condition. See CRETINISM. Consult G. R. Murray, *Diseases of the Thyroid Gland* (London, 1900), and Dock, "Diseases of the Thyroid Gland," in Sir William Osler, *Modern Medicine* (New York, 1915).

MYXOMA, mĭks-ō'mȧ (Gk. *μύξα, myxa*, mucus + *-ωμα, -ōma*). A tumor consisting of a gelatinous substance composed of mucin and peculiar branched or stellate cells. It is classed with the connective tissue tumors and has a jelly-like consistency. See TUMOR.

MYXOMYCETES, mĭks'ō-mī-sē'tēz (Neo-Lat. nom. pl., from Gk. *μύξα, myxa*, mucus + *μύκης, mykēs*, fungus). A group of organisms commonly called slime molds. Certain phases of their life history are very animal-like, but the spore case (with its spores) has many plant characteristics, and as the forms are described and classified by the spore cases, the work has naturally fallen within the province of botany. They are here treated as one of the great groups of the fungi (q.v.). The spores germinate in moist situations on the soil and in humus, giving rise each to a motile naked cell provided with a cilium (Figs. 6, 7, 8). These swarm cells swim around in the moisture, increasing in number by division (fission). After an active period they lose the cilia and creep around like amœbæ (Figs. 1, 2, 3), finally approaching one another and fusing in pairs, or perhaps several together. Such fused groups become centres of attraction to many hundreds of swarmers, which contribute their substances to the common mass. The result is a large protoplasmic body, called a plasmodium (Fig. 9), which moves over the surface of the humus and into crevices like a gigantic amœba. Its food is largely bacteria and other fungi, which are taken directly into the protoplasmic body and digested, the hard and worthless portions being discarded.

Vegetating plasmodia shun the light and seek moisture. But these habits are reversed when the spore cases are to be formed; the plasmodia then come to the light and take position in the

MYXOMYCETES.

Chondrioderma: 1, 2, 3, amœboid stage; 4, 5, resting stage; 6, 7, 8, motile stage; 9, plasmodium of *Stemonitis*, 10, sporangia.

driest situations that they can find. This is the time when plasmodia are most conspicuous and are frequently found on stumps, bark, and humus. The largest plasmodia may cover several square inches, but most of them are much smaller, and some are no larger than a pinhead.

The form of the spore cases is exceedingly various, some being large and irregular and others having extraordinary delicacy and complexity of structure, but the general history of spore formation is much the same. The plasmodium excretes a great deal of material (and frequently mineral matter) which forms the wall of the spore case (sporangium) and its stalk if present (Fig. 10). A filamentous network called the capillitium may also be developed inside the spore case, its function being to distribute the spores. The protoplasm which remains after these activities divides up into minute rounded bodies which, investing themselves with walls, become the spores. The plasmodia of slime molds have always been favorite subjects of observation by physiologists, who find in such specimens the largest masses of protoplasm that can be studied.

Consult, for a general account, Engler and Prantl, *Die natürlichen Pflanzenfamilien* (Leipzig, 1887); and for special descriptive treatment, Anton Bary, *Comparative Morphology and Biology of Fungi, Mycetozoa, and Bacteria* (Eng. trans., Oxford, 1887); Lister, *A Monograph of the Mycetozoa* (London, 1894); T. H. McBride, *The North American Slime Moulds* (New York, 1899); W. C. Sturgis, "Guide to the Botanical Literature of the Myxomycetes from 1875 to 1912," in *Colorado College, Publications, Science Series*, vol. xii (Colorado Springs, 1912).

MYZONTES, mī-zŏn'tēz. Same as Cyclostomi (q.v.).

N

N The fourteenth letter and eleventh consonant of the Roman alphabet. This character has varied very little in form and not at all in value since the origin of the alphabet. The original letter was apparently called *nun*, which in Phœnician and in the North Semitic languages signified 'fish.' Apparently the early pictographic character represented a fish. The small *n* is an outgrowth of the sign used in the Latin uncial alphabet which was a modification of the capital alphabet. See ALPHABET.

Phonetic Character. *N* stands for the dental or alveolar nasal sound which is the equivalent to *d* and *t*. The sound is produced by a check or mute contact and sonant vibration of the vocal cords as in *d* with the addition of the opening of the nasal passage made by lowering the soft palate. The size and shape of the resonance chamber make the difference between *n* and the other nasal letters. Under certain conditions *n* may have a syllabic or vocalic value, as in *rotten, forgotten.* In scientific linguistics this value is represented by *n̩*. It is sometimes silent after *m* or *l* in words usually of Latin origin, as in *damn, hymn, autumn, kiln.* Before *g, k, ch* it receives a semiguttural or palatal coloring to harmonize with the consonant it precedes, as in *long, think, pinch.* Though in Latin or Greek a final *n* of a prefix was usually assimilated to the value of a following consonant, in English it is much more stable (*unleaven, unbalance, unpack*). Among the nasals the linguidental *n* is by far the most frequently used in English, more than twice as often as *m*.

Source. In its historic development *n* represents an original *n* which has been preserved with great constancy through the Indo-Germanic period to the present time. Thus, *night*, Gothic *nahts*, Skt. *nakti*, Lat. *nox;* or again Indo-Ger. **nevos*, new, Skt. *navas*, Gk. *νεός*, Lat. *novus*, Goth. *niujis*, Ger. *neu*, Eng. *new.* In Anglo-Saxon an original Germanic *n* disappears before *s, f,* and *þ*.

As a Symbol. As a numeral N = 90 and $\bar{\text{N}}$ = 90,000. In chemistry N = nitrogen; Na = sodium (i.e., natrum). In mathematics N = an indefinite constant whole number, especially the class of a curve or the degree of an equation.

Consult: Philippe Berger, *Histoire de l'écriture dans l'antiquité* (Paris, 1892); Maurice Prou, *Manuel de paléographie latine et française* (ib., 1910); Sir E. M. Thompson, *Introduction to Greek and Latin Paleography* (London, 1912); Eduard Stucken, *Der Ursprung des Alphabets und die Mondstationen* (Leipzig, 1913). See ALPHABET; LETTERS; LIQUID; NASALS.

NABA, nä'bä. A seaport of Japan. See NAWA.

NABAB, nä'bäb', LE (Fr., The Nabob). A story by Alphonse Daudet (1877), based on the career of a contemporary adventurer.

NAB'ATÆ'ANS (Gk. *Ναβαταῖοι, Nabataioi*, Ar. *Nabaṭu*). An Arab people or tribe settled in various parts of the country east and southeast of Palestine, who formed during the Græco-Roman period a petty independent kingdom. Their history is known to us from classical authors, especially Diodorus and Josephus, as well as from numerous coins, and from inscriptions, dating from 169 B.C. to 105 A.D., which have been collected by De Vogué (1868), Doughty (1884), Huber (1884), and Euting (1885). They are located at various places from the Hauran in the north to Madain Salah (Al Hijr in northern Arabia) in the south. The Arabic character of the Nabatæans is evinced by their proper names, though they used a western Aramaic language and script, as the northern Arabic had not yet been reduced to writing. It is uncertain whether they are to be connected with an Arabic tribe descended from Nabaioth, mentioned together with Kedar as a son of Ishmael (Gen. xxv. 13, xxviii. 9, xxxvi. 3; 1 Chron. i. 29; Isa. lx. 7) and several times referred to as *Nabaiati* in the Assyrian inscriptions of Tiglath-pileser, Sargon, and Asurbanipal. The Nabatæans are first met with about 312 B.C. at Petra as nomads, but they were so strongly intrenched here that the generals sent against them by Antigonus, Athenæus, and Demetrius were unable to dislodge them. Though they were nomads they had an extensive trade in myrrh and spices from Arabia Felix, which they sent to the seaports, and in bitumen from the Dead Sea, which they sent to Egypt. The Nabatæan Kingdom arose in ancient Edom upon the ruins of the Seleucid and Ptolemaic empires. Its first prince was Aretas I, to whom the high priest Jason fled in 169 B.C. Its first King was probably Erotimus (Taim-Allat, 110–100 B.C.). Obedas I (90 B.C.) was able to hold his own against Alexander Jannæus, and Aretas III (Philellenos) against Antiochus XII of Cœle-Syria. The latter even conquered Damascus, but was driven out by the general of Pompey. Antony presented part of the land of the Nabatæans to Cleopatra. When Malchus I (50–28 B.C.) refused to pay tribute, his land was overrun by Herod. War broke out between

Herod and Aretas IV (9–40 A.D.), in which the Nabatæans were successful. When Paul was in Damascus that city must have been once again in the power of the Nabatæans (2 Cor. xi. 32). At the time of the Emperor Claudius, King Abias undertook an expedition against Adiabene, but he was beaten back. Damascus was lost to Nero in the reign of Malchus II (48–71). The last King of the Nabatæans was Rabel II (71–106). In 106 Cornelius Palma, Governor of Syria, made the region from Petra in the south to Bostra in the north into a Roman province. In the fourth century two provinces were created—Arabia with Bostra as a centre and Palæstina Tertia with Petra as a centre. The latest inscriptions in Nabatæan characters are those of Al Namarah (328), Zebed (512), and Harran (568); but the language is purely Arabic. Later Arabic writers use the word Nabatæan as the equivalent of Aramæan. The importance of the Nabatæans is due to the fact that they formed a sort of buffer state against the Arabs of the desert and because their country lay in the direct line of the caravan route from Arabia to Syria. Al Hijr was an emporium for the products of Yemen, and many mausoleums built in the rocks and beautifully carved are evidence of the riches which were concentrated here. The national temple was also situated at this place. The chief gods of the Nabatæan Pantheon seem to have been Dusares (*Dhu al Shara*), Manat, Kais, Allat, and Hobal. Consult: J. Euting, *Nabatäische Inschriften aus Arabien* (Berlin, 1885); Emil Schürer, *History of the Jewish People*, vol. i (Eng. trans., New York, 1896); Réne Dussaud, *Les Arabes en Syrie* (Paris, 1907); Brünnow and Domaszewski, *Die Provincia Arabia* (3 vols., Strassburg, 1904–09); Hermann Thiersch, *An den Rändern des römischen Reiches* (Munich, 1911); and the article "Nabatäer," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914).

NABBES, năbz, THOMAS. An English dramatist of the seventeenth century, born in Worcestershire. His first comedy, *Covent Garden*, was produced in London in 1632–33. His second attempt, *Tottenham Court* (1633), was followed by *Hannibal and Scipio: An Hystorical Tragedy* (1635) and a comedy called *The Bride* (1638); but more talent was displayed in his masques, two of which were published in 1639 under the title *The Spring's Glory*. An edition of his works was published by Bullen (London, 1887; *Old English Plays*, N. S., vols. i and ii).

NABHA, nä'bhà. An eastern native state of the Punjab, India (Map: India, C 2). Area, 966 square miles. It produces wheat, pulse, and barley. Pop., 1901, 297,949; 1911, 248,887. Capital, Nabha.

NABIGHA, nä'bê-gȧ, ZIYAD IBN MUAWIYA AL DHUBYANI. A famous pre-Islamic poet. Nabigha seems to be a surname indicating that his genius "jets forth vigorously and abundantly." He lived at the courts of Mundhir II, Mundhir III, and Nu'man ibn Mundhir. A too enthusiastic description of Queen Mutajarrida's charm forced him into exile. He became the court poet of Amr ibn Harith of Ghassan, but was finally reconciled to Nu'man. He differs from most of the Arabic poets of the period in being a man of profound religious sentiment. His Divan has been published by Derenbourg (Paris, 1868–69). Consult Carl Brockelmann, *Geschichte der arabischen Literatur*, vol. i (Weimar, 1898), and R. A. Nicholson, *A Literary History of the Arabs* (New York, 1907).

NABLUS. See NABULUS.

NA'BOB, or NA'BAB (Hind., Ar. *nawwāb*, deputy, from Ar. *nāba*, to replace, to be a deputy). Under the Mogul Empire of India, the administrator of a province comprised in the region ruled by a *subahdar*, or viceroy. The title was continued under the British rule, but gradually was applied to unofficial wealthy natives. In the United Kingdom and other European countries it is applied derisively to Euro-Indians who, having amassed fortunes in India, return to make an ostentatious display of their wealth.

NA'BONAS'SAR (Assyr. *Nabu-nasir*, Nabu (or Nebo) protects). King of Babylonia (747–734 B.C.). His contemporary in Assyria, Tiglath-pileser IV (745–728 B.C.), succeeded with the help of the Aramæan hordes that at all times were a menace to Babylonian security in obtaining complete control of Babylonia, and emphasized his success by giving himself in his inscriptions the title of King of Sumer and Accad and by worshiping at the shrines of the Babylonian gods in the most important cities of the south: Sippar, Nippur, Babylon, Borsippa, Cutha, Kish, Dilbat, and Erech. It is evident, therefore, that Nabonassar must have been merely a vassal to Tiglath-pileser IV, but a semblance of independence was permitted to Babylonia because of a desire on the part of the Assyrian rulers to deal leniently with the old Empire in the south for fear of incurring the displeasure of the Babylonian gods who were also the gods of Assyria. His name is preserved in the Ptolemaic canon, whose list of Babylonian kings begins indeed with Nabonassar. Why the beginning should have been made with this ruler is not clear. It has been supposed that the Babylonians began a new era—historical or astronomical—at the time of Nabonassar, since that date was adopted as a new astronomical era by the Greeks, but there is no direct evidence. Equally mysterious is Berosus' statement, preserved by Syncellus, that Nabonassar first collected and then destroyed the chronicles of his predecessors. Consult: R. W. Rogers, *History of Babylonia and Assyria*, vol. ii (New York, 1900); C. H. W. Johns, *Ancient Assyria* (ib., 1912); id., *Ancient Babylonia* (ib., 1913).

NABON'IDUS (Assyr. *Nabu-na'id*, Nabu (or Nebo) is exalted; Herodotus (i, 74, 77, 188) has erroneously Λαβύνητος, *Labynētos*). The last King of the Chaldæan Empire, sixth in order of succession from Nabopolassar (q.v.), the founder of this Empire. He was the son of a priestess of Sin at Harran and came to the throne in 556 B.C. as a result of a conspiracy formed apparently by the priests of the city of Babylon against Labashi Marduk (Gk. Labosoarchod), the son of Nergalsharuzur (Gk. Neriglossor), which cost Labashi Marduk his life. Nabonidus was a native Babylonian and not, as his predecessors since Nabopolassar, a Chaldæan. In his inscriptions, of which a large number have been found, he appears chiefly in the light of a builder and restorer of the sacred edifices in such ancient centres as Ur, Harran, and Sippar. While he did not neglect the sanctuaries of Marduk and Nebo at Babylon and Borsippa, yet his greater devotion to other centres appears to have aroused the opposition of the priests and of the population of Babylon,

and the neglect of suitable preparation to resist the threatening advance of Cyrus (q.v.) is probably to be ascribed to internal dissensions. In the beginning of his reign the Medes under Astyages attempted to add Mesopotamia to their Assyrian province, but were driven away from Harran by Nabonidus. After the conquest of Media by Cyrus in 553, this King occupied himself with Crœsus of Lydia until Sardis fell in 546, whereupon he turned against Babylonia. Nabonidus was a man of sincere piety who sought by zealous worship of the gods to avert the danger to the state. He rebuilt the ancient temples everywhere and dug in their foundations for the inscriptions of earlier kings. To the researches of his scribes and the excavations of his officials we are indebted for much information. It is not clear whether Nabonidus removed the images of the gods from other cities to Babylon in order to centralize all worship there or to save them. The great inscription of the Marduk priests plainly shows that they were plotting with Cyrus and that the city was delivered to Gubaru through their treachery. Babylon fell, as a Babylonian chronicle puts it, "without battle," in December, 539. Two days before, Nabonidus had to flee from the battle of Opis, as the army deserted to Gubaru, the Governor of Guti, who had sided with Cyrus and led the enemy to Babylon. Belsharazar (see BELSHAZZAR), the Crown Prince, is mentioned with the King in an oath of the year 12 (i.e., 544 B.C.) and elsewhere. What became of him is not known. In 538 Cyrus himself entered the city in triumph. Nabonidus was banished to Karmania, and Gubaru-Gobryas remained for several years governor of the city of Babylon. Consult: R. W. Rogers, *History of Babylonia and Assyria* (New York, 1900); and the Babylonian-Assyrian histories of F. Hommel (Berlin, 1885), C. P. Tiele (Gotha, 1886), H. Winckler (Leipzig, 1892), A. H. Sayce (London, 1900), C. H. W. Johns (London, 1911); also Scheil, in *Revue d'Assyriologie*, vol. xi (Paris, 1914); T. G. Pinches, "Fresh Light on Daniel," in *Expository Times* (London, 1915).

NAB'OPOLAS'SAR (Assyr. *Nabu-apal-uzur*, Nebo, protect the son). The founder of the Chaldæan Empire, King of Babylonia 625–605 B.C. He was not of royal birth, as is indicated by the absence of any reference to his father in the inscriptions that we have of him. By his own efforts he rose to a position of supremacy over the district of Chaldæa lying to the south of Babylonia proper as far as the Persian Gulf, which had managed even during the height of the Babylonian Empire to retain a certain measure of independence, and whose separate position continued to be recognized by the Assyrian kings when Babylonia had come under the control of Assyria. At various times the Chaldæans made attempts to regain their independence, and the growing weakness of Assyria after the death of Asurbanipal in 626 B.C. furnished the desired opportunity for the Chaldæans to reassert themselves and to extend their control from Chaldæa to Babylonia. Nabopolassar refused to recognize Asuritîlilaniukin, declared himself independent, and apparently entered into an alliance with Cyaxares of Media and Psammetichus of Egypt against Assyria. Nineveh was saved in 625 by the prompt appearance of Assyria's ally, the Scythian King Madyas, who drove away the Medes. But about 606 B.C. Nabopolassar, with the aid of the Medes, brought about the fall of Nineveh and the destruction of the Assyrian Empire. The Chaldæan Empire now became the controlling influence in the Euphrates valley, though Assyria proper had fallen to the share of Media. The few inscriptions of Nabopolassar which have been found show him to have been a man of force and energy, who managed not only to maintain his position against great odds, but to hand over to his son, Nebuchadnezzar, an empire almost as extensive and as powerful as was that of Assyria in her best days. He improved and enlarged the famous temple of Marduk in Babylon, and the sanctuaries of Shamash, the sun god, and of Belit at Sippar, and constructed a canal at the latter place to bring the waters of the Euphrates to the city walls. The Chaldæan origin of the last Babylonian Empire led to the use of the term Chaldæa among classical writers for Babylonia. See BABYLONIA. Consult R. W. Rogers, *History of Babylonia and Assyria* (New York, 1900), and the Babylonian-Assyrian histories of F. Hommel (Berlin, 1885), C. P. Tiele (Gotha, 1886), H. Winckler (Leipzig, 1892), A. H. Sayce (London, 1900), C. H. W. Johns (ib., 1911).

NA'BOTH. The owner of a parcel of land, described as a vineyard, in Jezreel, adjoining the palace of Ahab, King of Israel. When the latter proposed to buy the land Naboth refused to sell (1 Kings xxi. 1–14). Thereupon the Queen, Jezebel, is charged with having forged letters in the name of the King, exhorting the elders of his city to secure false witnesses who should swear that they had heard Naboth curse God and the King. Naboth was indeed put to death, and the King took possession of the land. For this Elijah denounced Ahab and predicted the downfall of his house, without suggesting, however, that the Queen was implicated in the crime. Probably the charge against the foreign Queen was popularly believed, and the barbarous murder of Jezebel was justified by it (1 Kings xxi; 2 Kings ix. 21 ff.). The story is interesting for the hints it gives as to local customs and popular ideas in Israel in the ninth century B.C. See AHAB; JEZEBEL.

NABU, nä'bo͞o. See NEBO; NEBO, MOUNT.

NABUA, nä'bo͞o-ä. A town of south Luzon, Philippines, in the Province of Ambos Camarines, 21 miles southeast of Nueva Cáceres. It is situated in a low, marshy region occupied by rice fields. The surrounding country produces rice. Pop., 1903, 18,893.

NABUCO, nä-bo͞o'kô, JOAQUIM (1849–1910). A Brazilian diplomat and writer, born at Recife. He was educated for the law, receiving his degree in 1871. He began his public career as attaché of the Brazilian legation in Washington. Returning to Brazil he was elected to Parliament in 1878 and was active in the cause of the abolition of slavery, visiting Rome in 1888 to obtain the support of the Pope for this measure. Having been closely identified with the Imperial régime, he held aloof from politics for a number of years after the establishment of the Republic in 1889. During this period he devoted himself to literary and historical studies and wrote his most important work, a constitutional history of the reign of Dom Pedro II. He again entered public life in 1899, serving on the commission to settle the boundary

dispute between Brazil and Great Britain. In 1901 he was named Minister to England and from 1905 to his death was the first Ambassador from Brazil to the United States. Active in the promotion of Pan-Americanism and in the development of a better understanding between the American nations, in 1906 Nabuco was president of the Third International Conference of American States at Rio de Janeiro. He was also a member of the Permanent Court of Arbitration at The Hague. Both in politics and in literature he showed himself an idealist. He was besides an able orator and was often called upon to deliver addresses both in his native land and in the United States. His writings, which have taken very high rank and show Anglo-Saxon and French influence, include: *Balmaceda* (1895), *A intervenção estangeira durante a revolta* (1896), and *Pensées détachées et souvenirs* (1906). Consult M. Oliveira Lima, "Ecrivains Bréziliens contemporains: Joaquim Nabuco," in *La Revue*, vol. lxxxvii (Paris, 1910).

NABULUS, nä'bụ-lōōs', or **NABLUS** (a contraction of *neapolis*, the new town). One of the chief cities of modern Palestine, the ancient Shechem (q.v.), by which name it is also known now: geographically the centre of Palestine. It is situated about 35 miles north of Jerusalem, in a well-watered and productive valley, between the mountains Jebel esh-Shemali (Ebal) on the north and Jebel et-Tor (Gerizim) on the south. The city is renowned for the large number of its perennial springs. It is the seat of government for central Palestine and the corresponding region beyond the Jordan, the residence of a Greek bishop, has several mosques and Mohammedan schools, and English and Latin mission establishments. The irrigation system built around the town is one of the most elaborate in Palestine. It has considerable industries, especially the manufacture of soap, and carries on a lively trade with the east-Jordan country and Jaffa. It has about 24,000 inhabitants, most of whom are Mohammedans who bear the reputation of being fanatical. The surviving remnant of the Samaritans, to the number of about 200, are believed to occupy the southwest part of the town. See SAMARITANS.

NA'CHI. See NATCHEZ.

NACHTIGAL, näc'tê-gâl, GUSTAV (1834–85). A German explorer, born at Eichstedt, near Stendal. He studied medicine at Halle, Würzburg, and Greifswald. He practiced as a military physician in Cologne and in 1863 went for his health to northern Africa, where he became a physician in the service of the Bey of Tunis. In 1869 he was commissioned by the King of Prussia to carry some gifts to the Sultan of Bornu in recognition of the latter's services to various German explorers. After a journey in the Tibbu country he set out for Kuka, the capital of Bornu, where he arrived in 1870. He made a thorough exploration of Bornu, then went to Lake Chad. Making his way to Bagirmi, he followed up the Shari River and its tributaries. In the spring of 1874 he set out for Egypt, going through Wadai, which he was the first European to penetrate. He visited Abeshr, the capital of Wadai, passed through Darfur, and arrived at Cairo in November, 1874. In 1875 he returned to Europe, where his explorations had made him famous. In 1884, as German Imperial Commissioner, he visited the west coast of Africa, where his explorations resulted in the acquisition by Germany (lost in the war in 1915) of Togoland, Kamerun, and Lüderitzland. Before finishing his labors, however, he was taken sick and died. His greatest work, *Sahara und Sudan*, was published in 1879–89. Consult Ruhle, *Gustav Nachtigal* (Münster, 1892).

NACOGDOCHES, năk'ō-dō'chĕz. A city and the county seat of Nacogdoches Co., Tex., 138 miles north by east of Houston, on the Houston, East and West Texas and the Texas and New Orleans railroads (Map: Texas, E 4). It has lumber mills, cotton gins, cotton compress, cottonseed-oil mill, brick plants, grain elevators, saw mills, etc.; and, as the commercial centre of a productive cotton-growing and farming region, controls wholesale interests of importance, and a trade in cotton, produce, live stock, tobacco, hides, and lumber. Noteworthy features are the public library, county courthouse, high school, Old Stone Fort, park, and the Aqua Vitæ Mineral Wells. The water works and electric-light plant are owned by the city. Pop., 1900, 1827; 1910, 3369. Nacogdoches owes its origin to a Spanish mission, established here early in the eighteenth century. As an outpost against American encroachment it played a part in the controversy between Spain and the United States over the Spanish possessions in the Southwest. It was captured in 1812 by an American filibustering party under Magee and Gutierrez.

NADAL', EHRMAN SYME (1843–). An American author, born at Lewisburg, W. Va. He graduated at Yale in 1864, was second secretary of the United States Legation at London in 1870–71 and 1877–83, and after 1884 was for several years a member of the staff of the New York *Nation*. He lectured on English composition at Columbia University in 1892–93. His publications include *Impressions of London Social Life* (1875); *Essays at Home and Elsewhere* (1882); *Zwiebak: Notes of a Professional Exile* (1895). He also contributed in similar vein to reviews and other periodicals, and was a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA.

NA'DEN, CONSTANCE CAROLINE WOODHILL (1858–89). An English poet, born at Edgbaston, Birmingham. She attended classes in science at the Birmingham and Midland Institute and at Mason College, and became a close student of Herbert Spencer, on whose philosophy she frequently gave lectures. Miss Naden published two volumes of poems: *Songs and Sonnets of Springtide* (1881), and *A Modern Apostle and other Poems* (1887), containing pieces, as "The Pantheist's Song of Immortality," that give her an assured place among the lesser poets. Consult the *Memoir* by W. R. Hughes and others (London, 1891); *Induction and Deduction*, a prize essay, ed. by Lewins (ib., 1890); and *Complete Poetical Works*, ed. by Lewins (ib., 1894).

NA'DIR (Ar. *nażir*, similar, corresponding (i.e., to the zenith), from *nazara*, to behold, to be face to face). That point in the heavens which is diametrically opposite to the zenith, so that the zenith, nadir, and centre of the earth are in one straight line. The zenith and nadir are 90° distant from every part of the horizon (q.v.). See ZENITH; MERIDIAN CIRCLE.

NADIR SHAH, nä-dēr' shä (1688–1747). A king of Persia. He belonged to the Afshars, a Turkish tribe. He was born near Kelat, in the centre of the Persian Province of Khorasan.

At the age of 17 he was taken prisoner by the Usbek Tatars, but, escaping after four years of captivity, he entered the service of the Governor of Khorasan, and soon obtained high promotion. Having, however, been degraded and punished for some real or supposed offense, he became an outlaw and for several years was the leader of a band of 3000 robbers. At this period the Persian throne was occupied by a usurper, Mir Vaiz, of the Afghan tribe of Ghilzai, who were bitterly hated by the Persians for cruelty and oppression. In favor of the rightful heir, Tahmasp II, Nadir took up arms against Malik Ashraf, the successor of Vaiz, and in token of his loyalty assumed the name of Tahmasp Kuli, or Slave of Tahmasp. Defeating the usurper in a series of engagements, he freed the provinces of Irak, Fars, and Kirman of even the semblance of Afghan domination. The assassination of Ashraf during his retreat terminated the war. Tahmasp then ascended the throne, and Nadir received for his services the government of the provinces of Khorasan, Mazanderan, Seistan, and Kirman. He was sent against the Turks in 1731, and defeated them at Hamadan, regaining the Armenian provinces which they had seized in the preceding reign. Meanwhile Tahmasp himself had been unsuccessful in his operations against the Turks. Nadir took this as a pretext to imprison the Shah, whose infant son, Abbas II, he placed on the throne in 1732. The death of this puppet, in 1736, opened the way for the elevation of Nadir himself, who was crowned as Nadir Shah, Feb. 26, 1736. To win the support of the Afghans, the new ruler declared the Sunnite form of Mohammedanism to be the state religion instead of the Shiite, which has always been favored by the Persians. Nadir resumed the war with the Turks, and, though totally defeated in the first two battles by the Grand Vizier Asman, turned the tide of fortune in the subsequent campaign, and granted peace to the Turks on condition of receiving Georgia. He also conquered Afghanistan, and drove back the invading Usbeks. His ambassador to the Great Mogul having been murdered together with his suite at Jalabad, and satisfaction having been refused, Nadir, in revenge, ravaged the Northwest Provinces and took Delhi, the capital of the Great Mogul, which was pillaged against his will (1739). With booty to the amount of $400,000,000, including the Koh-i-nur (q.v.) diamond and the famous peacock throne, he returned to the west bank of the Indus. He next reduced Bokhara and Khwarezm, restoring to Persia her limits under the Sassanids, and formed plans, which were never realized, for making Persia a maritime power. Embittered by an attempt to assassinate him in 1741, of prompting which he suspected the heir apparent, Rizakuli, whom he blinded and imprisoned, Nadir's character underwent a sudden change. Formerly open-hearted, liberal, and talented, he became suspicious, avaricious, and tyrannical. He was assassinated on June 20, 1747, by Salah Bey, captain of his guards, and was succeeded by his nephew, Ali, who ascended the throne as Adil Shah, or the "righteous king," but was deposed within a year. Consult H. Maynard, *Nadir Shah* (Oxford, 1885), and Sir H. M. Durand in the *Journal of the Asiatic Society* (London, 1908).

NADLER, nät'lĕr, Karl Christian Gottfried (1809–49). A German poet, who wrote in the dialect of the Rhenish Palatinate. He was born at Heidelberg and studied law there and at Berlin. His poems, under the title *Fröhlich Palz, Gott erhalts* (1847; 8th ed., illustrated, 1882; also No. 3369 et seq., Reclam ed.), were excellent pieces of genre verse, the drinking songs being peculiarly rollicking and musical. Consult the *Allgemeine deutsche Biographie*, vol. xxiii (Leipzig, 1886).

NADSON, nät'sŏn, Semion Yakovlevitch (1862–87). A Russian lyric poet of Jewish extraction. He was born in St. Petersburg, but spent his early childhood at Kiev. Left an orphan at 10, Nadson was sent in 1879 by his uncle to the Pavlov Military School. Military life proved so distasteful to him, however, that in 1884 he gladly accepted a modest position on a St. Petersburg weekly journal. A sojourn abroad could not check the tuberculosis which had set in very early, and Nadson died at 25. His brief literary career began in 1878, with a poem ("At Dawn") which appeared in a Russian periodical. A volume of collected verse was published in 1885 (17th ed., 1899). Other works were *Literary Sketches of 1883–86* (1886; 2d ed., 1887), reviews and other current comment; *Unfinished Sayings* (1902), posthumous papers; and *Prose* (1912), diary, letters, and an autobiographical sketch. Nadson lacks the energy, the eloquence, and the national sentiment of some of the great Russian poets. Preëminently a poet of youth, of dreamy ambitions and idealism, he owed his large contemporaneous popularity to a reaction from the social and moral disillusionment of the time. But his verse, melodious and plastic, tender and sincere, will make an appeal to all lovers of poetry. Consult R. Newmarch, *Poetry and Progress in Russia* (New York, 1907).

NAEGELI, nä'ge-lē, Karl Wilhelm (1817–91). A Swiss botanist, born in Kilchberg, near Zurich. After studying at Zurich, Geneva, and Berlin he began in 1842 to teach botany in Zurich, was made extraordinary professor in 1848, full professor at Freiburg in 1852 and at Zurich in 1855, and finally was appointed to the chair of botany at Munich in 1858. The name of Naegeli is one of the greatest names in the history of botany. Sachs said of him, "He laid the foundation of knowledge in every department of botany." The extent and importance of his work cannot be indicated in a brief sketch. He is known especially for the theory of cell formation, the micellar theory, growth by intussusception, classification of tissues on the basis of development, and a theory of evolution which he called progressive evolution, but which is now better known as orthogenesis. In coöperation with Schleiden he founded in 1844 the *Zeitschrift für wissenschaftliche Botanik*, in which was published his discovery of sperms in ferns, his *Zellenkerne, Zellenbildung, und Zellenwachstum* (1844–46). Among his most notable contributions were: *Neuen Algensysteme* (1847); *Die Stärkekörne* (1858); *Die Theorie des Capillaritat* (1866); *Das Mikroskop* (1867); *Die niedern Pilze* (1877).

NÆVIUS, Gnæus. One of the earliest Latin poets, born in the earlier half of the third century B.C. Some, on the basis of Aulus Gellius (i, 24, 1), have thought he was born in Campania; he may well, however, have been born in Rome, and so have been a Roman citizen by birth. In his youth he served in the First Punic War, but later made his appearance at Rome as a

dramatic writer (235 B.C.). He was very decidedly attached to the plebeian party, and in his plays satirized and lampooned the Roman nobles with extreme virulence. His rashness ultimately caused his banishment to Utica in Africa (204), where he died after 200. Besides his dramatic writings, comprising both tragedies and comedies, he wrote an epic poem, *De Bello Punico*, in the old Saturnian metre. He was most successful in comedy. Of the plays only a few fragments are extant, but these testify to his vigorous and independent Roman spirit. Evidence of his originality is seen (1) in the fact that his epic dealt with a Roman subject, independently (it was not a translation from the Greek, as the epic of Livius Andronicus had been), and (2) in the fact that he attempted tragedies based on Roman history. See LATIN LITERATURE II, *The Early or Pre-Classical Period*. The fragments may be found in Bothe's *Poetarum Latinorum Scenicorum Fragmenta* (Halberstadt, 1824); Klussmann's collection of the same (Jena, 1843); Müller's *Livii Andronici et Cn. Nævi Fabularum Reliquiæ* (Berlin, 1885); or Ribbeck's *Scænicæ Romanorum Poesis Fragmenta*, 2 vols. (3d ed., Leipzig, 1897–98). The fragments of his *Bellum Punicum* may be found in J. Wordsworth, *Fragments and Specimens of Early Latin* (Oxford, 1874); L. Havet, *De Saturnio Latinorum Versu* (Paris, 1880); C. Zander, *Versus Italici Antiqui* (Lund, 1890). Consult: W. Y. Sellar, *Roman Poets of the Republic* (3d ed., Oxford, 1889); J. W. Duff, *A Literary History of Rome* (London, 1909); Martin Schanz, *Geschichte der römischen Litteratur*, vol. i, part i (3d ed., Munich, 1907); F. Leo, *Geschichte der römischen Literatur*, vol. i (Leipzig, 1913).

NÆ'VUS (Lat., mole, wart, birthmark), or BIRTHMARK, MOTHER'S MARK. A congenital mark upon the skin consisting of the product of excessive development of fibrous tissue, hair, blood vessels, or pigment in a circumscribed area. The term is generally and perhaps more properly limited to a variety of angioma, or vascular tumor, usually of small size, composed of enlarged capillaries which communicate freely with other capillaries of the skin. The ordinary form of nævus is the *vasculosus*. This is present at birth or appears during the early months of the child's life, presenting itself as a red stain, or a diffuse flat patch, somewhat elevated above the surrounding surface. It may be a punctate spot, or may cover the side of the face or even the neck and chest, e.g. This variety is called port-wine mark, wine stain, *tache de feu*, or *feuermal*. The *nævus araneus*, or spider cancer, is not a cancer, but an angioma, consisting of a central elevated red point from which radiate dilated vessels so that there is a rough resemblance to a star. It is commonly single and occurs usually in children of about a year or two years old, and is generally situated on the nose or cheeks. The nævi of vascular variety are found in the papillary layer of the upper part of the corium, and consist of irregularly intertwined and dilated capillary vessels of new growth with free anastomosis. In some there is a layer of connective tissue found encircling the vessels, or an enormous growth of connective tissue, so that the result may resemble elephantiasis (q.v.). The treatment for the removal of nævi is surgical. Excision with the knife, ligature, transfixion of the growth with a cataract needle, compression by means of pads retained in place with a rubber band, chemical caustics, such as nitric acid or the acid nitrate of mercury, multiple linear scarification, X rays, treatment with radium, electropuncture, and electrolysis are the means employed, the last named being the best method of procedure. Vaccination directly upon the nævus is an obsolete means of removal. Port-wine marks may be removed by creating several minute cicatrices with the electric needle. Entire removal of an elevated mass may be effected by electrolysis, as in the case of a tumor (q.v.). Superficial nævi are satisfactorily destroyed, without scarring, by the application of carbon dioxide snow.

NÄFELS, nā'fĕls. A village in the Canton of Glarus, Switzerland, on the Linth, 4 miles north of the city of Glarus (Map: Switzerland, D 1). It was the scene of a famous battle, in 1388, in which 400 natives defeated an Austrian force of fifteen times their number. In 1799 the French under Molitor met and defeated the Russians who were trying to press their campaign into France. The village manufactures cotton, printing and iron construction material. Pop., 1910, 2818.

NAFTIA, näf'tē-ȧ, LAGO, or LAGO DEI PALICI. A small lake in Sicily, near Palagonia, in the Province of Catania. It is situated in a plain, near craggy hills, in an ancient crater about 500 feet in circumference. At several points in the centre the water bubbles violently, sometimes rising to the height of 2 feet or more under the pressure of the outpouring of carbonic-acid gas. The water is greenish, or turbid, and has an odor of naphtha. The atmosphere is fatal to birds attempting to fly across the surface of the lake and to small animals which approach it to satisfy their thirst; while to lean over it is believed to produce dizziness and headache in man. The ancients regarded these phenomena with great dread. Here were worshiped by the Siculi, the pre-Greek inhabitants of the island, a pair of chthonic gods of mighty power, called commonly by the Romans Palici (Gk. *Παλικοί*). In the great servile revolt against Rome (104 B.C.) the temple here was the headquarters of the conspirators. Consult E. A. Freeman, *History of Sicily*, vol. i (Oxford, 1891).

NAGA, nä'gȧ (Skt. *nāga*, serpent). In Hindu mythology, a member of a fabulous race of semidivine serpents with human faces but reptile forms, inhabiting the lower world (Nāga-loka, world of serpents), where their capital, Bhogavati, was a scene of magnificence and splendor. They were 1000 in number, and Sesha, the sacred serpent of Vishnu, was their king. In one of his preëxistences the Buddha saved the life of a Naga, and in his last existence he often had relations with them. The name Naga was applied also to an actual race of people in Central India, perhaps so called from their worship of serpents, and this people has left historical traces, although fable and myth doubtless become mixed in allusions to the serpent race. See NAGAS.

NAGA. A town of Cebú, Philippines, on the east coast, 12 miles southwest of Cebú. It is a port of call for steamers and coasting vessels. Pop., 1903, 16,884.

NAGANA, nȧ-gä'nȧ. A disease of live stock prevalent in South Africa, caused by parasitic Hæmatozoa, which are carried from a diseased animal to a healthy one by the tsetse fly (q.v.). See SLEEPING SICKNESS.

NAGANO, nȧ-gä'nō. An inland city of Hondo, Japan, about 95 miles south-southwest of Niigata

(Map: Japan, F 5). It is celebrated principally for the Buddhist temple of Zenkoji, one of the most famous temples in Japan, founded in the latter part of the seventh century. The town is visited by many pilgrims, and carries on a considerable trade in textiles and woven goods. Pop., 1898, 31,319; 1908, 39,242.

NAGAR, nŭg'ăr. See BEDNUR.

NAGARI, nä'gà-rē. See DEVANAGARI.

NAGĀRJUNA, nà-gär'jōō-nà, or **NĀGASĒNA,** nä'gà-sā'nà. A great Buddhist sage and teacher, the founder of the Mādhyamika school of northern Buddhism, also famous because of his religious conference or discussion with the Græco-Bactrian King Menander or Milinda (q.v.). Among the numerous works attributed to him by tradition is a long commentary on the *Mahāprajñā-pārāmitā Sūtra.* Many medical treatises are ascribed to him by Chinese writers, and he is considered the author of several didactic poems. Consult Walleser, *Die mittlere Lehre (Mādhyamika-šāstra), nach der tibetischen Version* (Heidelberg, 1911); La Vallée Poussin, *Mūlamadhyamakakārikās (Mādhyamikasūtras) de Nāgārjana avec la Prasannapadā* (St. Petersburg, 1913); Wenzel, *Journal of the Pali Text Society* (1866).

NAGAS, nä'gàz. The natives of the Naga Hills in southeastern Assam. The Nagas of Manipur and the mountains extending to the north (Patkoi, Barai) of this country seem to be Indonesians, more or less pure, while on the Lushai Hills, south of Manipur, are probably Nagas mixed with Kyens and Burmese of Arakan. The Nagas live in permanent villages, the headmen of which hold their power largely by the exercise of sacerdotal functions. Marriage is exogamous, with paternal relationship. Many interesting taboos and kindred usages are in vogue. The Nagas are best subdivided into the Angami and Kanpui of the west, who wear a petticoat or apron, the Lhota and Hot in the centre, who wear a plaid, and the Nangta, or naked, in the east. Consult W. H. Furness, *The Home Life of the Borneo Head-Hunters* (Philadelphia, 1902), and T. C. Hodsdon, *Naga Tribes of Manipur* (New York, 1911). See INDO-CHINESE.

NAGASAKI, nä'gà-sä'kē. The capital of an important prefecture of the same name and one of the principal seaports of Japan, situated on a small peninsula in the northwest of the island of Kiushu, in long. 129° 52′ E. and lat. 32° 44′ N. (Map: Japan, A 7). The harbor, about 3 miles long, is one of the safest in the East, and sufficiently deep for vessels of 26 feet draft. The town has water works with filter beds, a meteorological station, schools, a theatre, and hospitals. The principal industrial establishments are the Akunoura Engine Works and several shipyards. The foreign commerce of Nagasaki amounted in 1913 to $10,399,497, of which $2,363,318 represented exports. The principal imports are cotton, coal, sugar, and petroleum, and the chief exports coal, rice, flour, camphor, vegetable wax, and tobacco. Nagasaki is an important coaling station. The principal countries of the world are represented by consuls. Pop., 1898, 107,422; 1903, 153,293; 1908, 176,480; 1913, 160,450. Its commercial importance dates from the sixteenth century, when it became the stronghold of the Japanese Christians and an important centre in the foreign trade of Japan. When the Europeans were expelled from Japan the Dutch were permitted to maintain their factory on the islet of Deshima (q.v.). Nagasaki then became the only point of communication between Japan and Europe. It was opened to foreign commerce by the Treaty of 1858.

NĀGASENA, nä'gà-sā'nà. See NAGĀRJUNA.

NAGCARLÁN, näg'kär-län'. A town of central Luzon, Philippines, in the Province of La Laguna, 11 miles south of Laguna. Pop., 1903, 10,212.

NAGEL, nä'gel, ALBRECHT EDUARD (1833–95). A German ophthalmologist. He was born at Danzig, studied first at Königsberg and then at Berlin under Gräfe, and, after practicing in his birthplace for several years, became docent (1864) and professor of ophthalmology (1867) at Tübingen. He was also director of the ophthalmic hospital connected with the university. His most important discovery was the identity of the retinas as opposed to the theory of projection. This is explained in his book, *Das Sehen mit zwei Augen* (1861). Nagel's further writings include: *Die Refraktions- und Akkommodationsanomalien des Auges* (1866); *Behandlung der Amaurosen und Amblyopien mit Strychnin* (1871); *Die Vorbildung zum medizinischen Studium und die Frage der Schulreform* (1890).

NAGEL, nā'gel, CHARLES (1849–). An American lawyer and cabinet officer, born in Colorado Co., Tex. His father was opposed to secession and removed to St. Louis, where Nagel studied law at Washington University (graduating 1872) and in the offices of Glover and Shepley. After taking a postgraduate course at Berlin he began a successful practice in St. Louis as a member of the firm of Finkelnburg, Nagel, and Kirby. From 1886 to 1906 he was lecturer in the St. Louis Law School. He was elected to the Missouri State Legislature as a Republican in 1881, but was defeated as candidate for councilman in St. Louis in 1891 and for district judge in 1892, although he had been active in party politics. In 1893, however, he was elected president of the council, serving, during a part of his term, as acting mayor, in which capacity he urged economy and reform in the penal and charitable institutions. During the violent street-railway strikes he headed a volunteer committee of 70 which endeavored to effect peace by arbitrating the differences between the strikers and the traction powers. In 1909 he was appointed by President Taft Secretary of Commerce and Labor, a post which he held throughout the administration and one in which his intimate knowledge of labor and transportation problems was serviceable. He advocated the passage of laws granting reciprocity agreements and the arrangement of ship subsidies as an encouragement of American commerce, and was active in initiating at least 64 arbitrations between railroad employers and their laborers and between numerous other corporations and their employees.

NÄGELSBACH, nā'gĕls-bäg, KARL FRIEDRICH (1806–59). A German classical scholar and professor at Erlangen (1842). He was born near Nuremberg, and was the author of a popular *Lateinische Stylistik* (1846, and often reissued); *Die homerische Theologie* (rev. ed., 1861); *Die nachhomerische Theologie* (1857). He edited the *Agamemnon of Æschylus* (1863).

NAGLER, nä'glēr, GEORG KASPAR (1801–66). A German writer on art, born at Untersüssbach, Bavaria. After establishing himself at Munich as an antiquary he began the publication of his

Neues allgemeines Künstlerlexikon (22 vols., 1835–52), a monument of industry and careful research. Another important work is *Die Monogrammisten* (vols. i–iii, 1857–63; vol. iv, ed. by Andresen, 1871; vol. v, ed. by Clauss, 1879); besides which he published monographs on Raphael, Dürer, Michelangelo, and Rembrandt, creditable for their day but superseded by more modern works.

NA'GOR (African name). A West African antelope (*Cervicapra redunca*), one of the reedbucks.

NAGOYA, nä-gō'yä. The capital of the Province of Owari, Japan, in the island of Hondo, 94 miles by rail east-northeast of Kyoto (Map: Japan, E 6). It formerly belonged to the house of Owari, one of the most prominent houses in Japan, whose castle, dating from the beginning of the seventeenth century, is the principal feature of Nagoya and contains many specimens of the work of some of the best artists of Japan. Another interesting feature is the Buddhist temple of Higashi-Hongwanji with beautiful specimens of wood carving. In the vicinity of the town is the industrial settlement of Sedo, where the first glazed pottery in Japan was produced in the thirteenth century and where the first work in cloisonné enameling in the country was done in the nineteenth century. Nagoya is still one of the most important pottery centres in Japan, the industry employing almost its entire population. It has also extensive manufactures of cotton and silk and embroideries. Pop., 1898, 244,145; 1908, 378,231; 1913, 447,951.

NAGPUR, nâg-pōōr', or **NAGPORE.** A division of the Central Provinces (q.v.), British India, comprising the districts of Nagpur, Bhandara, Chanda, Wardha, and Balaghat. Area, 23,521 square miles; pop., 1901, 2,728,063; 1911, 3,109,838. The surface consists of an alternation of low hills, fertile river valleys, and plains from west to east. Cotton, pulse, rice, maize, oilseed and other seeds, fruits, and vegetables are largely cultivated, and the division is famous for its oranges. The chief minerals are coal, antimony, manganese, ochre, and gold. The Gonds (q.v.) inhabit the hilly sections. Nagpur, formerly a part of the great Mahratta kingdom, was ruled by the rajahs of Berar until 1853, when the dynasty became extinct and the territory was annexed by the British. Capital, Nagpur.

NAGPUR, or **NAGPORE.** The capital of the Central Provinces, British India, and of a division and district, 520 miles by rail east-northeast of Bombay (Map: India, D 5). It is situated in an unhealthful place on the banks of the Nag, a small stream, and with its extensive suburb of Sitabaldi, the European quarter, covers an area 7 miles in circumference. This part is centred by the fort-crowned Sitabaldi Hill. Here, also, on the north, are the bazars and the cantonment with Heslop College, Morris College, and the Victoria Technical Institute. Several fine Hindu temples of Mahrattan architecture, handsome gardens, monumental tanks, and the tombs of the Bhonsla Rajahs and a museum are notable native features. Nagpur is the focus of trade and industry in Central India. There are many large cotton mills and compresses. There are manufactures of silk and cutlery, and a considerable trade in agricultural produce, salt, and European manufactured goods. Nagpur is noted for the oranges which it exports. The city became the capital of an independent Mahratta rajah in 1740. In 1817 it was the scene of an attack by Rajah Appa Sahib with 18,000 troops on the British Residency. The Resident, Mr. Jenkins, who had anticipated trouble and had managed to assemble 1350 men under Colonel Scott, defeated the assailants after 18 hours' fighting. A second battle a month later resulted in the Rajah's submission and subsequent deposition. Pop., 1901, 127,734; 1911, 101,415.

NAGUABO, nä-gwä'bō. A city of the Department of Humacao, Porto Rico, situated near the east end of the island, on the highway running from Humacao to Fajardo (Map: Porto Rico, G 3). It is located at the foot of the Luquillo Mountains, a short distance from the coast. The surrounding district produces chiefly sugar cane, grapefruit, and oranges. Pop., 1899, municipal, 10,873; urban, 1812; 1910, municipal, 14,365; urban, 3303.

NAGUILÍAN, nä'gē-lē'än. A town of north Luzon, Philippines, in the Province of La Unión, on the Bauang River, 11 miles southeast of San Fernando. Pop., 1903, 11,885.

NAGYBÁNYA, nŏd'y'-bän'yŏ. A royal free town in the County of Szatmár, Hungary, situated among the Lápos Mountains, 90 miles east of Debreczen (Map: Hungary, H 3). It has a state college, and its chief industries are gold, silver, lead, and copper mining and viniculture, but there are also manufactures of linen and cotton goods and spirits. Pop., 1910 (arrondissement), 30,569.

NAGYBECSKEREK, -bĕch'kĕ-rĕk. A town of Hungary. See BECSKEREK.

NAGYKANIZSA. See KANIZSA, NAGY.

NAGYKÁROLY, -kä'rôl-y'. The capital of the County of Szatmár, Hungary, situated 41 miles east-northeast of Debreczen (Map: Hungary, H 3). It has a fine church, a palace of the Counts Károlyi, a Piarist monastery, and Gymnasium. Its chief products are coarse cloth, linen, leather, cutlery, tobacco, and bricks. It became the seat of the Károlyi family in the fourteenth century. Pop., 1910 (arrondissement), 43,692.

NAGYKIKINDA, -kē'kĕn-dŏ, or GROSS KIKINDA. A town in the County of Torontál, Hungary, situated 36 miles by rail west of Temesvár (Map: Hungary, G 4). It has a higher Gymnasium. The products include flour and meal, and there is an extensive trade in agricultural products and domestic animals. Pop., 1910 (arrondissement), 32,987, about one-half Serbs.

NAGYKÖRÖS, -kē'rēsh. A town of Hungary. See Körös.

NAGYSZEBEN, -sē'bĕn. A town of Hungary. See HERMANNSTADT.

NAGYSZOMBAT, -sôm'bŏt. The Hungarian name of Tyrnau (q.v.).

NAGY-VÁRAD, -vä'rŏd, or **GROSSWARDEIN,** grōs'vär-dīn. The capital of the County of Bihar, Hungary, situated in a beautiful plain on the Sebes Körös (the rapid Körös), 38 miles south-southeast of Debreczen, at the intersection of several railroad lines (Map: Hungary, G 3). It consists of the town proper and several suburbs and has many beautiful dwellings. It was formerly strongly fortified, and its ancient fortress, built on a neck of land between the Körös and Pecze, is still utilized as barracks. Grosswardein is the seat of a Roman Catholic and of a Greek Orthodox bishop. Its notable

ecclesiastical buildings include the large Roman Catholic cathedral, the Greek Catholic and Greek Orthodox cathedrals, the church of St. Ladislas, which contains the remains of the sainted King, and the palace of the Roman Catholic bishop. The theatre and town hall are finely constructed new buildings, and there is an archæological and art museum. Educational institutions are very numerous, among them being a celebrated school of law, a priests' seminary, a Roman Catholic and a Calvinistic Gymnasium, a commercial school, a girls' high school, and a library of 15,000 volumes. It has flourishing manufactures of pottery, earthenware, oil, vinegar, machinery, bricks, stoves, art objects, spirits, and starch, and the district produces an excellent quality of wine. The sulphur springs of Hajó are situated 6 miles to the south. The city has running water. Pop., 1900, 50,177; 1910, 64,169. Nagy-Várad, one of the oldest cities of Hungary, is said to have been founded by St. Ladislas in 1080, and was destroyed by the Tatars in 1241. It was held by the Turks from 1660 to 1692.

NAHANE. A Déné tribe in the interior of northern British Columbia, composed of the Tahltan, Takutine, and Kaska. Consult A. G. Morice, in *Transactions of the Canadian Institute*, vol. vii (Toronto, 1904).

NAHANT'. A town in Essex Co., Mass., on a peninsula extending into Massachusetts Bay; reached by electric cars from Lynn (4 miles) and in summer by steamers from Boston (10 miles) (Map: Massachusetts, F 3). It has a large public library. Nahant has been for years a favorite place of summer resort for Boston people, and has many handsome seaside residences. Pop., 1900, 1182; 1910, 1184. The site of Nahant is said to have been the landfall of the Northmen. It was visited in 1614 by Capt. John Smith, and in 1622 was granted to Capt. Robert Gorges. Until 1853, when it was incorporated as a separate town, Nahant was a part of Lynn. Consult Hurd, *History of Essex County, Massachusetts* (Philadelphia, 1888).

NAHARRO, nä-är'rō, Bartolomé de Torres. See Torres Naharro, Bartolomé de.

NAHR EL ASI, när' ĕl ä'sĕ. A river of Syria. See Orontes.

NAHUAN (nä'wan) **STOCK.** An American linguistic stock embracing tribes of high and low culture over a great range of territory. A recent study by Sapir goes far to prove what has long been suspected, viz., that the Shoshonean, Piman, and Nahuan language stocks should be thrown into a single great stock. This combined stock would be far the most important in the New World, extending from Idaho to Costa Rica and embracing several millions of souls.

Swanton in his linguistic map of Mexico and Central America gives 19 subgroups for his Nahuan stock (which includes the Piman but not the Shoshonean). The northern tribes seem never to have developed a remarkable culture, although all are in the agriculture, weaving, and pottery-making stage. The Huichol have some interesting customs. In general status they are about halfway between the tribes of central Mexico and the Pueblo Indians of New Mexico and Arizona. They have little god houses which are the most northern examples of the Mexican temple. Concerning the former languages of the states of Zacatecas, Aguascalientes, and San Luis Potosí we have little knowledge except that they belonged to the Nahuan stock.

The Mexicano, or Nahua proper, is distributed in many closely related dialects down the west coast of Mexico from Culiacán to Acapulco. From this southern point it spreads eastward over the valley of Mexico and to the southern shores of the Gulf of Campeche. From here on its southern distribution is discontinuous. Areas of Nahuan speech are found in Guatemala, Salvador, Nicaragua, and Costa Rica. In the valley of Mexico the principal dialects were Aztec and Tlaxcalan. The Guatemala and Salvador tribes were called Pipiles (boys), because their pronunciation was impure. The Niquiran on the shores of Lake Nicaragua gave their name to Nicaragua. The southernmost colony was the Sigua on the Chiriqui lagoon.

The distribution of the Nahuan languages has an archæological as well as a linguistic interest. It can be pretty clearly shown that the spread took place after the invention of agriculture and particularly after the cultivation of maize. Now this important food plant is supposed to be developed from a wild plant that grows on the Mexican highlands. It is not unlikely that the spreading Nahuan tribes were great culture carriers. The earliest horizon of culture in Mexico is called the archaic. It was evidently developed by a people in the agriculture stage. It is found in almost identical form in all the areas in which dialects of the Mexican subgroup of the Nahuan stock were spoken, from Sinaloa to Costa Rica, and is rare elsewhere. After the primary distribution there were doubtless many shiftings of population, for the Nahuan tribes developed war, trade, and government to a high plane. For a historical discussion, see the article Mexican Archæology. See also Indians, American, *Indians of Mexico*.

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NAHUATLAN (nä'wä-tlan) **STOCK.** See Nahuan Stock.

NAHUEL HUAPÍ, nä-wāl' wä-pē', or Tiger Lake. A lake on the east slope of the Andes in Argentina, on the boundary between the territories of Neuquen and Río Negro (Map: Argentina, E 6). It is 75 miles long, with an average width of 10 miles and an area of 309 square miles. It contains a number of islands covered with luxuriant vegetation, and its banks are fertile and well watered. It receives many streams and discharges into the Atlantic Ocean through the Río Negro. The lake was discovered in 1690 by Jesuit missionaries traveling eastward from Chile.

NA'HUM. The seventh of the minor prophets according to the usual arrangement. Nothing is known of his life except what may be gathered from the notice in the first verse of his prophecy, where he is called the Elkoshite. Where Elkosh was is uncertain. It has been located in Galilee and in Assyria; a third identification is with Beit Jibrin (Eleutheropolis) in the Shep-

helah. Nahum's prophecy consists of two parts, besides the introductory verse: (1) a psalm (i. 2–ii. 2), which describes the majesty of God and His punishment of His enemies in somewhat general terms; and (2) the prophecy proper (ii. 3–iii. 19), which foretells the doom of Nineveh. The style is full of animation and fancy and, at the same time, clear and rounded. The text is in part corrupt. The date of the prophecy cannot be fixed exactly, but must have been later than the capture of Thebes in Egypt (the "No" of iii. 8; see No-Amon) by Asurbanipal, 663 B.C., and it must have been before the fall of Nineveh, about 606 B.C. Nahum differs from the other preëxilic prophets whose words have come down to us in absence of rebuke of his own people and his attitude of fierce expectation of punishment of the enemy. The investigations of Bickell and Gunkel have established with certainty traces of an original acrostic arrangement in the psalm, and this artificiality points to a late date for this part of the book; it fits in with the conditions existing during the Persian rule in Palestine, when the religious community of Jerusalem was struggling against great odds, and may have been prefixed by an editor to the genuine prophecy of Nahum as an appropriate introduction. If this be the fact, it would be quite in accordance with the free treatment to which older discourses were subjected by post-exilic compilers.

Bibliography. Consult the commentaries mentioned under Minor Prophets; Gunkel, in *Zeitschrift für alttestamentliche Wissenschaft*, vol. xiii (Giessen, 1893); Bickell, *Beiträge zur semitischen Metrik* (Vienna, 1894); Billerbeck and Jeremias, "Der Untergang Ninive's und die Weissagungsschrift des Nahum," in *Beiträge zur Assyriologie* (Leipzig, 1895); A. B. Davidson, "Nahum, Habakkuk, and Zephaniah," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1896); S. R. Driver, in *Century Bible* (London, 1906); Haller, in *Die Religion in Geschichte und Gegenwart* (Tübingen, 1913).

NAHUYS VAN BURGST, nä'hois vän bōōrgst, Hubert Gerard, Baron (1782–1858). A Dutch colonial soldier and geographical author, born in Amsterdam. In 1809 he went to Batavia, where he entered the army and fought against the English in Bengal. In 1814 he was appointed Commissioner to the Prince of Java. Nahuys was pensioned in 1830, and nine years afterward returned to Holland, settling at Breda. His writings, which are of no small geographical importance, include *Schets van Benkoelen op de westkust van het eiland Sumatra* (1826) and *Beschouwingen over Nederlandsch-Indië* (1847; 2d ed., 1848).

NAIADS, nā'yădz (Gk. *Naïdes, Naïdes, Νηϊάδες, Nēïades*, from *νᾶν, nan,* to flow; connected with Lat. *navis*, Gk. *vaūs, naus*, Skt. *nāu*, ship). In Greek mythology, the nymphs of the springs and hence also of rivers. Caves, especially with trickling water, were sacred to them and were believed to be their dwellings. Owing to the medicinal qualities of some springs, the Naiads naturally appear as healing divinities, and, since divination was associated with the water, they became prophetic. Under their influence the prophet became inspired or even mad. See also Nymph.

NAIANT, nā'ănt, or **NATANT,** nā'tănt (OF., swimming). An heraldic term applied to a fish when borne horizontally across the shield in a swimming position. See Heraldry.

NAIDU, nī'dōō, Sarojini (1879–). A Hindu author and reformer. She was born in Hyderabad, the daughter of Dr. Aghorenath Chattopâdhyây, an educator, of Bengali Brahmin stock, who had studied at Edinburgh and Bonn. In 1883 she married Dr. Naidu, principal medical officer in the service of the Nizam. She had been educated in England (1895–98)—at King's College, London, and at Girton, Cambridge. King Edward VIII gave her the gold Kaiser-i-Hind for organizing flood-relief work in Hyderabad in 1908. She lectured throughout India on social and religious questions and published two volumes of English verse, *The Golden Threshold* (1905), preface by Arthur Symonds, and *The Bird of Time* (1912), preface by Edmund Gosse, which were translated into many of the Indian vernaculars.

NAIL (AS. *nægel*, OHG. *nagal*, Ger. *Nagel*, nail, Goth. *ga-nagljan*, to nail; connected with OChurch Slav. *nogŭti*, Lith. *nagas*, Skt. *nakha*, nail). The terms "nail," "claw," and "hoof" are popular names for different developments of the same epidermal formation. All are horny secretions formed from the outer layer of the skin, primarily to protect the tip of the digits in the higher vertebrates. Nails have retained this function, while claws have become specialized as weapons of offense or defense, and hoofs are specialized to protect the whole of the terminal joint of the digit. Hoofs are usually thick, heavy, and blunt, and are best developed where the number of digits is reduced; they are characteristic of the great group of herbivorous animals known as Ungulata, and reach their highest development in the horse. Nails are flattened, usually thin, and more or less rounded at the end. They are present in some reptiles, in certain birds (as the grebes), and in many mammals, especially the monkeys and man. Cf. Horn.

Human Nails. These are the elastic, horny plates placed as protective coverings on the dorsal surface of the terminal phalanges of the fingers and toes. Each nail consists of a root, or part concealed within a fold of skin; a body, or exposed part attached to the surface of the skin; and a free anterior extremity called the edge. The skin below the root and body of the nail is termed the matrix, from its being the part from which the nail is produced. This is thick and covered with highly vascular papillæ, and its color is seen through the transparent horny tissue. Near the root the papillæ are smaller and less vascular; hence the portion of nail corresponding to this part is of a whiter color; from its form, this portion is termed the lunula. The chemical composition of the nails is given in the article Horn. According to the observation of Beau, the finger nails grow at the rate of about one-thirtieth of an inch in a week, while the toe nails grow with only about one-fourth of that rapidity. The general state of health influences the growth of nails, and after illness a deficient formation of horny matter may result, shown by the production of a groove across the nail. The breadth and position of this groove indicate roughly the period and duration of the illness. An inflammation of the matrix of the nail is called *onychia*. The affection is apt to be syphilitic in origin. The nail rots and crumbles away at the root; the free edges crack and split; and there are pain, redness, and swelling of the soft tissues. An acute inflammation of the tissues about the nail is termed *paronychia* or *whitlow*. When a nail has

been removed by violence, or has been thrown off in consequence of the formation of matter (pus) beneath it, a new nail is speedily formed, provided the matrix has not been seriously injured.

There is a very common and troublesome affection popularly known as *ingrowing nail*. Its most usual seat is the great toe. It does not in reality arise from any alteration of the nail, but from the adjacent soft parts being constantly pressed against its edge by the use of tight shoes. These parts become swollen and inflamed; suppuration ensues, and an intensely sensitive ulcer is formed, in which the nail is embedded. In obstinate cases it is not infrequently necessary to remove a portion of the nail, an operation which may be done under local anæsthesia without pain. *Subungual exostosis* consists of an overgrowth of bone on the distal phalanx, generally of the great toe, forming a painful swelling, the only cure for which is surgical.

The appearance of the nails is of considerable import in diagnosis. The nails of gouty persons are hard, brittle, and longitudinally striated. Great hypertrophy of the nails, with changes in their structure, is occasionally seen and is termed *megalonychosis*. Its cause is not known. Irregular development, fragility, dryness, and cracking of the nails are observed in syphilis, as a result of trophic changes after nerve injuries and diseases, in Raynaud's disease and in scleroderma. Growth is sometimes arrested in hemiplegia and acute infantile spinal paralysis. In victims of the chloral habit ecchymoses and ulcers may sometimes be seen at the base of the nail.

NAILS. Slender pieces of metal, tapering towards and sometimes pointed at one end and with flattened or rounded heads. Nails are made of many different materials, as copper, zinc, brass, iron, or steel, but the bulk of the nails in ordinary use are made of steel wire. Iron nails, in turn, may be either wrought, cut, or cast, or made from wire.

Until almost the close of the eighteenth century all nails were hand-made. In France for nearly a century light nails for carpenter work have been made of wire, but until 1850 they were made by hand with a hammer. The hand-made nail was pinched in a vise, with a portion projecting. A few blows of a hammer flattened one end into a head. The head was beaten into a counter sunk in the vise, thus regulating its size and shape. In northern Europe, Britain, and America nails were made, at first, by forging on an anvil. The iron used for hand nail making was first formed into nail rods, which were sold in bundles. The nail rods were prepared either by rolling the malleable iron into small bars of the required thickness or by the much more common practice of cutting plate iron into strips by means of rolling shears. In Colonial days the making of nails from these rods was a household industry among the New England farmers.

To America belongs the distinction of having first made cut nails by machinery, and with the advent of machine-cut nails the household industry of nail making rapidly declined. Of these early inventions the only one that has survived is that patented in 1786 by Ezekiel Reed, of Bridgewater, Mass. At the close of the eighteenth century 23 patents for nail machines, or improvements thereto, had been granted in the United States, and their use had been generally introduced into England, where they were received with enthusiasm. In 1883 cut nails were first made of steel.

The manufacture of tacks was also a household industry in New England till well into the nineteenth century. The wire was pointed on a small anvil; it was then placed in a vise, worked by the foot, which clutched it between jaws furnished with a gauge to regulate the length. A certain portion was left projecting, which was beaten by a hammer into a flat head. New England, and particularly the city of Taunton, Mass., is now the centre of the tack-making industry in the United States.

Wire nails were first made in the United States by William Hersel, of New York, in 1851 or 1852. In 1875 Father Goebel, a Catholic priest, went to Covington, Ky., from Germany, where the art of making wire nails was practiced. Goebel began the manufacture of wire nails at Covington, and in 1876 the American Wire and Screw Nail Company was established under his leadership. At first the nails were made by hand, but soon a French machine was imported. In this machine the nails were held in dies to form the head. The blow of the hammer which produced the head was caused by a board or single leaf spring suspended from a ceiling, against which the machine, in rotating, pushed a cam. The release of the latter produced the blow.

For a time the wire nails were made with barbs, that they might hold more securely, and the new industry grew but slowly. In 1876, at the Centennial Exhibition, the company received a silver medal over French and German competitors. This called the attention of the trade to the article, and two other firms at once took up its manufacture. By 1885 there were 26 firms in the business, and the wire nail had been adopted by many manufacturers. Since then their use has rapidly increased.

Two types of wire-nail machines are described in Smith's *Treatise on Wire*. (See *Bibliography* at end of article.) In one type "the wire is automatically straightened from the coil and fed into the machine, where dies grip it, while a pair of nippers cuts the wire off in suitable lengths, when it is automatically pointed and headed. The latter operation is effected by means of the spring-bolt mechanism operated by a cam of the main shaft and remaining inoperative until a sufficient length of wire has been fed to the machine for the next nail. The cutting and pointing are performed in one operation." In the second type the heads are formed by steady pressure instead of intermittent striking.

The older process of making cut nails is, in general, as follows: the ore, whether hematite or magnetic, is smelted in a blast furnace, run into pigs, puddled, squeezed, and, if need be, hammered, rolled in the puddling-ball train, and cut to lengths. These are then fagoted (i.e., piled so as to break joints), reheated to a white heat, drawn, passed through the nail-plate train, and the sheets, of the required width and thickness, allowed to cool. It is next cut across its length (the width of the sheet being usually about a foot) into strips which are a little wider than the length of the required nail. These plates, heated by being set on edge on hot coals, are seized in a clamp and fed to the machine, end first. The pieces cut out are alternate, and slightly tapering, of course, with the fibre, and are squeezed and headed up by the machine before going into the trough.

In 1897 the wire nails produced in the United States amounted to 8,997,245 kegs of 100 pounds each and in 1909 to 13,926,861 kegs. The output of cut nails for the same year was 2,106,799 kegs and, in 1909, 1,009,319 kegs. American wire nails are largely exported to Europe and to other parts of the world.

The accompanying table shows the export of nails from the United States from 1896 to 1914.

NAILS EXPORTED FROM THE UNITED STATES

(From the Statistical Abstract for 1914, prepared by the Bureau of Foreign and Domestic Commerce, under the direction of the Secretary of Commerce and Labor)

FISCAL YEAR	Cut		Wire	
	Pounds	Value	Pounds	Value
1896	20,730,260	$428,630	.....	.....
1897	26,476,585	519,471	.....	.....
1898	32,310,399	612,234	22,894,099	$458,787
1899	32,869,265	604,215	51,193,212	973,434
1900	24,915,866	647,711	84,635,468	2,124,528
1901	25,953,322	575,285	44,612,619	982,313
1902	15,266,626	318,539	46,416,697	947,242
1903	16,129,436	347,607	62,997,105	1,245,946
1904	21,448,899	445,033	72,646,550	1,517,876
1905	20,386,670	404,400	82,558,131	1,793,230
1906	15,427,539	314,485	99,842,011	2,095,488
1907	17,630,335	371,673	89,494,612	2,098,465
1908	14,517,462	335,271	79,612,680	1,983,465
1909	17,950,795	396,262	59,995,196	1,299,086
1910	19,949,278	407,904	81,531,280	1,705,026
1911	22,853,944	434,788	112,094,392	2,364,271
1912	27,669,712	472,217	140,931,548	2,865,980
1913	10,764,208	203,272	122,139,208	2,541,250
1914	10,136,030	191,389	80,310,081	1,693,132

Consult: Smith, *Treatise on Wire, its Manufacture and Uses* (London and New York, 1891); Swank, *History and Manufacture of Iron in All Ages* (Philadelphia, 1892); "Steel Wire and Nail Making," in *Scientific American*, vol. lxxxix (New York, 1903).

NAIN (Gk. *Naín*). A town in Galilee, mentioned once in the New Testament (Luke vii. 11–17), as the scene of Jesus' raising of a widow's son from death. It lay on the northern slope of the Jabel ed Daḥi, popularly known as Little Hermon, and was some 6 miles southeast of Nazareth and some 2 miles southwest of Endor (Map: Palestine, C 2). Its distance from Capernaum, some 20 miles, places it well within the limits of Jesus' second preaching tour, which must have included a more distant circle of towns than the suburban villages of Capernaum visited on the first tour (Mark i. 38). This journey is referred to in Luke viii. 1–3, and is most likely to have included this incident, though it is mentioned in the previous chapter. The site is now occupied by a small and squalid village of mud huts, the modern name of which is *Nein*. Ruins stretching to the north show the place to have been at one time of some importance. Their relatively modern character, however, gives us no evidence as to the size of the place in Jesus' time; while the varied use of *πόλις* (city) in the Gospels indicates nothing definite as to its character. In these ruins there is no trace of city walls (against Tristam, *Land of Israel*, p. 125); so that the gate referred to in the Gospel incident is in all probability merely the ordinary entrance of the road into the town. (Consult Conder, *Tent Work*, p. 63.) The rock tombs to the west are of undoubted antiquity. A little sanctuary, called "The Place of our Lord Jesus," marks the site of an early chapel, erected doubtless to commemorate the incident referred to by Luke. The situation of the village, though only some 700 feet above the sea, commands an interesting view of the plain of Esdraelon, with Mount Carmel to the southwest, Mount Tabor to the west, and Mount Hermon to the northeast. Sir W. M. Ramsay (*Education of Christ*, preface, p. ix, New York, 1911) believes the ancient town to have stood on the top of the hill, though he offers no proof of his view.

NAIN DE TILLEMONT, Sébastien le. See Tillemont, S. le N. de.

NAIN SING (?–1882). A Hindu explorer in Central Asia, born at Namaon. He was trained by a Colonel Montgomerie for exploring work and in 1856 and 1857 was employed in Kashmir and Ladak by the Schlagintweits. His journey to Lhasa (1865–66) was rewarded by the Royal Geographical Society. In 1867 he explored the gold mines of Thok Jalung, and he went with Sir Douglas Forsyth to Yarkand in 1873. His most important journey was from Leh across the unexplored plateau of Tibet in 1874–75, marking its many lakes, to Lhasa, and thence to Calcutta. For a description, with map, of this expedition, consult the *Geographical Magazine* (London, 1876).

NAIPALI (nī-pä'lē) **LANGUAGE.** The Indian language spoken in Nepal. This dialect approaches in general structure more closely to Hindi than to any other of the modern Indian vernaculars. Thus, as examples showing the affinity of Naipali to the New Indian dialects, may be cited Naipali *pāk* (ripe), Bengali *pākā*, Hindi *pakkā*, Sindhi *pakō* (Skt. *pakva*); Naipali *mahaingō* (costly), Hindi *mahaingā* (Skt. *mahārgha*); Naipali *dhīlō* (loose), Hindi *ḍhīlā* (Skt. *śithila*); Naipali *dūt* (milk), Hindi *dudh*, Panjabi *dudd* (Skt. *dugdha*). In inflection also there are parallels, as Naipali *gar chum* (I do), Gujarati *karuṁ chuṁ*. Distinctive marks of Naipali are the occasional aspiration of medial consonants (e.g., *aghi*, 'before,' Hindi *agē*, Prakrit *aggē*, Skt. *agrē*), softening of initial surds (e.g., Naipali *garanu*, 'to make,' Hindu *karnā*, Skt. *kar*), and the use of an agential case as the active subject of a passive voice (a curious phenomenon widespread in the modern Indo-Iranian languages) in *-le* corresponding to the Hindi *-nē* (e.g., Naipali *dūtlē*, '[by the] milk,' Hindi *dudhnē*). The language has a number, possibly one-fifth, of loan words from its Tibeto-Burman neighbors, but has maintained itself on the whole with considerable purity. It has a very scanty literature written in the Devanagari character.

Consult: A. F. R. Hoernle, *Comparative Grammar of the Gaudian Languages* (London, 1880); Dravid, *English Guide for the Use of Nepali Students* (Benares, 1901); L. H. Gray, *Indo-Iranian Phonology* (New York, 1902); Turnbull, *Nepali Grammar, and English-Nepali and Nepali-English Vocabulary* (Darjeeling, 1904); Sylvain Lévi, *Le Népal, étude historique d'un royaume hindou* (3 vols., Paris, 1905–08).

NAIRN, nârn. The capital of Nairnshire, Scotland, a royal municipal and police burgh, 15 miles northeast of Inverness, at the mouth of the river Nairn (Map: Scotland, E 2). It is noted for the excellence of its sea bathing and artificial baths. It manufactures rope and twine and has salmon fisheries and quarries near by. Pop., 1901, 5089; 1911, 5906.

NAIRNE, nârn, Carolina (Oliphant), Baroness (1766–1845). A Scottish song writer, born at Gask, Perthshire. In 1806 she married

her second cousin, Major William Murray Nairne (afterward sixth Lord Nairne); lived in Edinburgh till her husband's death (1829), afterward in Ireland and on the Continent; and returned to Gask, where she died. Between 1821 and 1824 she contributed songs to the *Scottish Minstrel* of R. A. Smith. As a song writer she is highly esteemed. Particularly beautiful are "Land o' the Leal," "Caller Herrin'," "The Laird o' Cockpen," and "The Auld House." Appearing anonymously in her lifetime, her poems were posthumously collected in *Lays from Strathearn* (1846). Consult Rogers, *Life and Songs of Lady Nairne* (Edinburgh, 1869), and Kington Oliphant, *Jacobite Lairds* (Grampian Club, 1870).

NAIRN'SHIRE. A county in the northeast division of Scotland, bounded by the Moray Firth and the counties of Inverness and Elgin (Map: Scotland, E 2). Area, 163 square miles, of which about 26,000 acres are under cultivation. There is considerable agricultural activity on the low fertile soil near the coast, but the land rises into low mountainous regions in the south. The county is known for its cattle breeding, and there are also profitable granite quarries and fisheries. Capital, Nairn. Pop., 1901, 9291; 1911, 9319.

NAIROBI, nī-rō'bē. The capital of British East Africa and of the Province of Ukamba, 327 miles northwest of Mombasa by rail (Map: Africa, H 5). It lies on the Athie Plains, some 5500 feet above sea level, at the foot of the Kikuyu Hills, and is the headquarters of the government of the Protectorate and of the Uganda Railway. The government buildings are situated at the foot of the hills, and beyond them lies a thriving town, with extensive railroad works, government and Roman Catholic schools, excellent hotels, stores, athletic grounds, and a race course. The public buildings include the town hall, the general hospital, the theatre, and Anglican, Roman Catholic, Moslem, and Hindu places of worship. The commercial life of a large East Indian population centres in the picturesque bazar, which runs at right angles from the main street of the town. The official residents are found dwelling upon the hill overlooking the government buildings, and beyond its brow is the cantonment of the King's African Rifles. The civilian inhabitants prefer the suburb of Parklands, situated on the plain about a mile and a half from the town. Pop., 1914, about 30,000, of whom some 1200 are Europeans, 3500 East Indians, and the rest natives of various tribes. In the immediate vicinity are some 400 European farmers, and the town is visited annually by large numbers of sportsmen from all parts of the world, attracted by the big-game shooting for which the Protectorate is famous.

NAIRS, nā'ẽrz, or NAYARS. The landholder class of Malabar, in southwestern Hindustan. Originally the military dominant class, they have assimilated some of the indigenous populations and now form a conglomerate of different castes and tribes; they nevertheless, in many cases, contrast sharply with the Dravidians by their fine type, their light complexion, and their thin and prominent nose. They number over 1,000,000 and are divided into a northern and a southern community, which keep apart from each other. They seem to have some linguistic and somatological affinities with the Indo-Aryans. They are probably a mixed race of Aryans and Malayalas. By all writers they are described as a tall people, gracious in manner. Many of the women are quite pretty. The history of the Nairs begins with the invasion of the ancient Hindus and the establishment of a Brahman aristocracy—a conflict between these privileged classes and the democratic masses ended in victory for the latter and laid the foundations of the prosperity of the Nairs in the thirteenth century. Islam of a sort is in vogue, together with the older Hinduism. Through all these changes the peculiar marriage system, which has made the Nairs of special interest to ethnologists, has not been wholly obliterated. This system, often called the Nair family, is polyandry (often adelphic) with matriarchal joint family. It has now fallen into disuse, but succession is still traced through females, a man's sister's children being his nearest heirs. Consult E. S. Schmidt, "Die Nairs," in *Globus*, vol. lxviii (Brunswick, 1895), and Fawcett, "Nayars of Malabar," in *Bulletin of the Madras Government Museum*, vol. iii (Madras, 1901).

NAISSANT, nā'sănt (Fr., being born). A term applied in heraldic blazon to an animal depicted as coming forth out of the middle—not, like *issuant*, out of the boundary line—of an ordinary. See HERALDRY.

NAIVASH'A. A town in British East Africa, capital of Naivasha Province, 391 miles by rail northwest of Mombasa (Map: Congo, C 3). It stands, some 6230 feet above sea level, on the shores of Lake Naivasha, a picturesque circular body of water, about 13 miles in diameter, which is a famous haunt of hippopotami. The town is the centre of a rapidly progressing district where European farmers are conducting sheep running and wheat growing on an extensive scale. In the neighboring Rift valley there are prosperous ostrich farms, and a considerable volume of maize is raised for export.

NA'JA (from Hind. *nāg*, Skt. *nāga*, snake). A genus of elapine venomous serpents of the tropical parts of the Old World, which includes the cobras. The typical species is the common hooded cobra (*Naja haje*) of Africa, called asp in the north and spy slange or spitting snake among the Dutch of South Africa. Other species are the cobra di capello and hamadryad. See COBRA; HAMADRYAD; PROTEROGLYPHA; and Plate of FOREIGN VENOMOUS SERPENTS with the article SNAKE.

NAJAC, nà'zhàk', EMILE, COUNT DE (1828–89). A French dramatic author, born at Lorient (Morbihan). Except for a short time spent in a government position, he gave himself entirely to the writing of farces, texts for operas, and vaudevilles, sometimes in collaboration and sometimes alone. Among these are: *Un mari en 150* (1853); *La fille de trente ans* (1859), with Scribe; *Le capitaine Bitterlin* (1860), with About; *Un mariage de Paris* (1861), with About; *Nos gens* (1866), with About; *Bébé* (1877), with Hennequin; *Nounou* (1879), with Hennequin; *Divorçons* (1886), with Sardou; *Le fiacre 117* (1886), with Millaud.

NAKAMURA MASANAO, nä'kà-mōō'rà mä'sà-nä'ō (1825–?). A Japanese scholar, born in Yeddo. He went to England in 1866 and remained there for two years, returning home on the outbreak of the revolution. Thenceforth until his death he labored perseveringly in the interest of modern education. His schools and translations exerted wide influence, and his serv-

ices were recognized by posthumous honors conferred by the Emperor.

NAKANE, nä'kä'nā. The name of two leading Japanese mathematicians, father and son. The elder, Nakane Genkei (1661–1733), was born in the Province of Omi and studied under Takebe (q.v.). In early years he was a physician in Kyoto. He was particularly well known in the field of astronomy. His son was Nakane Genjun (1701–61), whose *Kaihō Yeijiku-jutsu* (1729) contained a new method of solving numerical higher equations. Consult Smith and Mikami, *History of Japanese Mathematics* (Chicago, 1914).

NAKED BAT. A large Malayan, long-tailed, emballonurine bat (*Chiromeles torquatus*), remarkable in having the skin entirely hairless except for a fringe of hairs about the neck. It has a projecting, piglike snout and a thick tail. It inhabits the forests of Java, Sumatra, and Borneo, where it appears only at night. Its most curious feature is the presence of a pouch or pocket of skin on each side of the body under the arms, which is present in both sexes and contains the mammæ. In this pouch the young are carried while suckling. Consult Horsfield, *Zoölogical Researches in Java* (London, 1828), and Dobson, *Catalogue of Cheiroptera in the British Museum* (ib., 1878). See Plate of Bats.

NAKHITCHEVAN, nä'kĕ-chĕ-vän'. A former town in the Government of Ekaterinoslav, Russia, situated on a hill on the right bank of the Don, 2½ miles from Rostov-on-the-Don, with which it is now incorporated (Map: Russia, E 5). It has manufactures of silk, woolen, and silver goods and has a considerable trade in jewelry and precious stones with Constantinople, Turkestan, Circassia, and Astrakhan. The town was founded by Armenians from the Crimea in 1779 and is the see of the Russian Greek-Armenian Patriarch. Pop., 1897, 29,312; 1910, 71,000, mostly Armenians.

NAKONG, nä-kông' (African name). One of the harnessed antelopes of south Central and East Africa, called also Speke's antelope, sitatunga, and *Tragelaphus spekei*. It is peculiar for its perfectly uniform grayish color when mature. It formerly gathered in herds and was one of the most highly prized of the smaller species. See Plate of Gazelles and Small Antelopes.

NAKSHATRA, nāk-shä'trā (Skt. *nakṣatra*, star, luminary; of doubtful etymology). A Sanskrit term used in the Vedic period in the sense of star. At a later time it was applied to the asterisms lying in the moon's path or to the mansions in which the moon was supposed to rest in its path. The number of these asterisms was reckoned originally at 27, later at 28; and mythology transformed them into the daughters of Daksha, who became the wives of the moon. Consult Thibaut, "Astronomie, Astrologie, und Mathematik," in Bühler, *Grundriss der indoarischen Philologie* (Strassburg, 1899).

NAKSKOV, nāk'skôv. A town of Denmark, situated on Nakskov Fiord, on the west coast of the island of Laaland (Map: Denmark, E 4). It is the terminus of the Laaland Railroad, has the largest sugar refinery in the country, with other factories, and has a harbor with considerable shipping and an active trade in grain. Pop., 1901, 8317; 1911, 9480.

NALA, nä'lä. A legendary king of ancient India whose domain was Nishadha, apparently a district between the modern Oudh and Berar. The story of his marriage with Damayantī, the daughter of King Bhima of Vidarbha (modern Berar), together with the events which followed in consequence of his passion for gambling, the loss of his kingdom, his desertion of wife and children, the final reunion with them, and the restoration of his fortunes, forms one of the most romantic episodes of the Mahabharata (q.v.). This episode, entitled the *Nalōpākhyānam* (Story of Nala), has often been separately edited and translated: as an edition of the Sanskrit text, together with Dean Milman's translation (1835), by Monier-Williams (Oxford, 1860, 1876); a versified rendering by Sir Edwin Arnold, *Indian Idylls* (Boston, 1883); a translation into German prose by Kellner, *Nala und Damayantī* (Leipzig, 1886), besides several others by Kosegarten (Jena, 1820), Rüskert (Frankfort, 1828), Bopp (Berlin, 1838), Meier (Stuttgart, 1847), and Holtzmann (Karlsruhe, 1847; Stuttgart, 1854). There are, furthermore, translations into Latin by Bopp (3d ed., 1868), into Swedish by Edgren, into French by Aignan (1823) and by Burnouf, and into Italian by St. Gatti. The poem is marked by a high tone of morality, shown in the rare fidelity of Damayantī, as well as by tender pathos. Among the many ancient traits with which it is replete is the simplicity of the manners of its leading characters—the Prince, e.g., prepares his own food.

The subject of Nala's career was a favorite theme with the Hindus. One of these, the Sanskrit *Nalōdaya* (Rise of Nala), describes in four cantos the restoration of Nala's fortunes. This artificial poem is ascribed to Kalidasa, but it probably belongs to a much later age. It is a remarkable specimen of the so-called Kavya style of artificial composition, abounding in elaborate metrical devices, alliterative versification, intricate rhythms, complicated constructions, and pedantic imagery. It has been edited by Benary (Berlin, 1830), by Yates (Calcutta, 1844), and by Vidyasagara (ib., 1873). An excellent German translation, imitating the artificial devices of the original, was made by Von Schack, *Stimmen vom Ganges* (2d ed., Stuttgart, 1877).

To the same Nala cycle belongs the *Nāishadhīya*, or *Nāishadha-Carata* (Adventures of Nala of Nishadha), written in 22 cantos by one Sri-Harsha, who belongs to the latter half of the twelfth century of our era. An edition of this, with the Sanskrit commentary of Narayana, was published by Röer (Calcutta, 1855) and by Swadatta (Bombay, 1894). Consult Lobedanz, *König Nal und sein Weib* (Leipzig, 1863), and A. A. Macdonell, *History of Sanskrit Literature* (London, 1913).

NAMANGAN, nä'män-gän'. A district town in the Territory of Ferghana, Russian Turkestan. It is situated in the elevated valley of the Syr Darya and on the canal of Yangi (fed by the Naryn), about 45 miles northwest of New Margelan, the capital of the territory (Map: Asia, Central, O 2). The chief occupations are cotton ginning and the manufacturing of soap, leather, etc. The trade in cotton, fruit, and animal products is important. Pop., 1908, 73,279, including only a few Russians.

NAMAQUALAND, nä-mä'kwä-länd, Little. A region of the Cape Province, South Africa, bordering on German Southwest Africa (Map: Cape of Good Hope, C, D 7). It is a portion of the Cape Province proper, while Great Namaqualand is the south extremity of former German

Southwest Africa. The majority of its inhabitants are Hottentots, numbering about 23,000. It is important on account of its copper deposits. The chief town is Port Nolloth on the coast.

NAMATIANUS, Claudius Rutilius. See Rutilius Namatianus, Claudius.

NAMAYCUSH, nām'ā-kūsh (North American Indian name). The lake or Mackinaw trout (*Christivomer namaycush*), the largest of the Salmonidæ. It is closely related to the chars, from which it differs slightly in the character of the vomerine teeth. It is a very good food fish and is the second in commercial importance of the fish of the Great Lakes. Extreme weights of 125 pounds have been reported, but the average is from 15 to 20 pounds. Its food is fishes and a great variety of other things. The spawning season is during September and November. The namaycush occurs in the Great Lakes and in the inland lakes of New York and northern New England, where the local names "longe" and "togue" are applied to it. It is also found in the headwäters of the Fraser and Columbia rivers and the streams of Vancouver Island. A deep-water variety, called siscowet (q.v.), is found in Lake Superior. Its flesh is fatter and less desirable as food. See Salmon; Trout; and consult authorities there cited. See also Fisheries, and Plate of Trout and Grayling.

NAMDEV. See Marathi.

NAM DINH, näm dēn'y'. A city of Tonkin, French Indo-China, situated 40 miles southeast of Hanoi, on the Tonkin River, 30 miles from the sea (Map: French Indo-China, E 2). It lies in the most fertile region of the delta and is prosperous and well built, with broad, paved streets. It is the seat of a French Resident and the intellectual centre of Tonkin. It is almost as important commercially as Hanoi, has numerous well-stocked shops, regular boat service on the river, and a brisk trade in rice, silk, cotton, and indigo. It has a cotton mill with 25,000 spindles. Pop., about 40,000.

NAME (AS. *nama*, Goth. *namō*, OHG. *namo*, Ger. *Name;* connected with Lat. *nomen*, Gk. *ὄνομα*, *onoma*, Ir. *ainm*, OPruss. *emnes*, OChurch Slav. *ime*, name, and with Lat. *gnoscere*, Gk. *γιγνώσκειν*, *gignōskein*, Skt. *jñā*, Ger. *kennen*, Eng. *know*). In law, a word or words employed to designate a person, place, or thing. In early times in England the first, or Christian, name of a person was the only one recognized by the law, and surnames were mere words of description to identify one person from another having the same Christian name. This practice was confirmed and received legal sanction by a statute (1 Hen. V, c. 8), called the Statute of Additions, which provided that not only the name of an individual should be inserted in a writ or indictment, but his estate or degree, his calling or business, and the town or district in which he resided. By reason of the above custom and the statute many persons who had not otherwise adopted surnames were known by the name of their calling, place of residence, or by some other characteristic. Thus, George, the smith, became George Smith, and John of Wessyngton became John Wessyngton.

In law, the middle name or initial of a person is generally regarded as of no importance and not a part of his legal name. Therefore the omission of it in a legal instrument or in legal proceedings is not considered an error, except in a few jurisdictions. In general a person's Christian name should be written out, and in some States the mere initial of the Christian name, together with the surname, has been held insufficient under statutes requiring the names of persons to be subscribed to certain instruments.

Owing to the almost infinite variety of surnames and the consequent difficulty in spelling them properly, the courts have adopted a rule known as the rule of *idem sonans* (the same sound), by which they determine whether or not an incorrect spelling of a name is a fatal error in legal documents. This rule provides that where a name is not correctly spelled, if it sounds identically like the name intended to be written, it will be held sufficient, the error in spelling being disregarded. Thus, the surnames Preyer, Prior, and Pryor have been held to be *idem sonans*. This rule is followed as to legal instruments and transactions generally, but where a name in an instrument varies in some irregular manner from the common method of spelling a name identically the same in pronunciation, the necessity for departing under certain circumstances from the doctrine of *idem sonans* is apparent, as in the case of such as Jaeger and Yaeger, which may be pronounced so as to sound alike, and a person searching against the name of Jaeger would naturally not find the record of the conveyance under Yaeger; and accordingly the courts may hold that the public is not bound by constructive notice in such a case.

Legally a person is under no obligation to bear the surname of his parents nor the Christian name conferred upon him in infancy, and he may, therefore, change his name at will, subject only to the possible inconvenience of proving his identity if it should be called in question. To obviate this difficulty it is usual for a person desiring to change his name, in whole or in part, to make application to some court or judge to authorize the change. The order of the court in such case, being matter of public record, furnishes the means for identification when required. The matter of change of name is in many States regulated by statute, and the application for such change is usually granted as a matter of course, unless it appears that it might result in hindering or defrauding creditors of the applicant.

There are statutory provisions in some jurisdictions requiring the registration of fictitious trade names, where persons adopt them and do not do business under their correct names. Corporations are usually required to adopt names which are not identical with those of other corporations in the same State. At common law there is no property right in a name, but the United States statutes provide for protection in the use of trade names to a certain extent, and courts of equity will sometimes interfere to enjoin the wrongful use of the business name of another, to prevent fraud. See Cognomen; Misnomer; Title; Trade Name; Trade-Mark.

NAME OF JESUS, Litany of the. See Litany.

NAM'PA. A city in Canyon Co., Idaho, 22 miles west of Boise, the State capital, and on the Oregon Short Line and the Idaho Traction railroads (Map: Idaho, B 6). It contains a State sanitarium and a Carnegie library. Gold and silver mines and large bodies of pine timber are tributary to the city, but its chief interests are in live stock, grain, dairying, and fruit growing. It lies in the district of the

large Boise irrigation project. Nampa owns its water works. Pop., 1900, 799; 1910, 4205.

NAMUR, nä'mụr'. A province of Belgium, bounded on the north by Brabant and Liége, on the east by the Province of Luxemburg, on the south by France, and on the west by Hainault (Map: Belgium, C 4). Area, 1413 square miles. The province is traversed through the centre by the Meuse River. Its surface is partly level, partly hilly, and in part densely forested. The soil is very fertile, and agriculture is the chief occupation, though a large proportion of the population is engaged in mining and allied industries. About 750,000 tons of coal are mined yearly, and the province is rich in iron, lead, sulphur, alum, and marble. Pop., 1910, 362,846. Namur appears as a county in the tenth century and came successively under the counts of Hainault and Flanders and the dukes of Burgundy, finally constituting one of the 17 provinces of the Netherlands. It was occupied by the Germans during the European War which broke out in 1914.

NAMUR. The capital of the Province of Namur, Belgium, at the confluence of the Sambre and Meuse, 35 miles southeast of Brussels (Map: Belgium, C 4). Two bridges across the Meuse connect it with the extensive suburb of Jambes, and several bridges span the Sambre to the suburb of Salzinnes. An extensive circle of nine detached forts has revived its former military importance, and there are large cavalry barracks in the town. Among many fine churches is the Renaissance cathedral of St. Aubin, built in 1751–67 and noted for the beauty of its statues, carvings, and paintings. The Archæological Museum has a valuable collection of Roman and Frankish antiquities and a library of 20,000 volumes. An art gallery is attached to the Hôtel de Ville. The old citadel near by has been leveled, and the grounds laid out in a recreation park. Namur is an important industrial centre, with iron and brass foundries, and is known for its manufactures of cutlery, machinery, chicory, glass, leather, and bronze art objects. Near by are iron and coal mines, and a good river trade moves down the Meuse. The city was taken by the forces of Louis XIV in 1692, and three years later was besieged and captured by William III. It was taken by the French in 1746 and restored to Austria in 1748. For a third time it fell into the hands of the French in 1792. It was captured by the Germans after a stubborn resistance during the European War which began in 1914. (See WAR IN EUROPE.) Pop., 1900, 32,333; 1910, 31,273.

NANA, nä'nä'. One of the Rougon-Macquart series of novels by Emile Zola (1880).

NANAIMO, nä-nī'mō. A city, port of entry, and the capital of the Nanaimo electoral district, British Columbia, Canada, on Departure Bay, on the east coast of Vancouver Island, and on the Esquimalt and Nanaimo Railway, about 73 miles northwest of Victoria (Map: British Columbia, D 5). It is opposite Vancouver City on the mainland, with which it has daily steamboat communication; has a safe and commodious harbor; and is a centre of the coal-mining and herring industries of British Columbia, its coal fields having an area of 200 square miles. It has county buildings, a customhouse, and a Roman Catholic convent. It also has large lumber mills and manufactories of bricks, beer, aërated water, foundry and machine-shop products, explosives, sashes and doors. Copper and brick clay are found in the vicinity. The city dates from the erection of the Hudson's Bay Company blockhouse in 1833. It was incorporated in 1874. The water works and electric-lighting system are owned and operated by the municipality. The United States is represented by a consular agent. Pop., 1901, 6130; 1911, 8306.

NANAK. See NANEK.

NANA SAHIB, nä'nä sä'hīb (c.1825–c.60). A Hindu, one of the leaders of the Sepoy Mutiny of 1857. He is said to have been the son of a Brahman from the Deccan, and his real name was Dandhu Panth. He was born about 1825 and was adopted as a son in 1827 by Baji Rao, the childless ex-Peshwa of Poona, whose estate, which amounted to more than $1,000,000, he inherited. He was refused, however, the annual pension of eight lakhs of rupees, or about $400,000, which had been granted Baji Rao after his surrender in 1818. This rankled in his mind, although he was allowed to retain some of the state of a native prince, a retinue of 200 soldiers, with three fieldpieces, and a fortified residence at Bithur, 10 miles west of Cawnpore. He had long maintained an agent in England, Azim Ulla Khan, who told him tales of British weakness. When, therefore, the mutiny broke out in May, 1857, Nana Sahib offered to assist the English, but treacherously placed himself at the head of the mutineers in Cawnpore. The European troops were induced, on June 25, to capitulate to Nana Sahib, who promised they should be sent down the Ganges in safety. They embarked on boats provided for them, but had no sooner done so than a murderous fire was opened upon them. The sepoys were ordered to shoot the men, but to spare the women and children, who were removed to a house in Cawnpore. On July 15, Sir H. Havelock, who had advanced from Allahabad, defeated the sepoys in two engagements, one within 8 miles of Cawnpore; and Nana Sahib thereupon directed that the women and children should be put to death, and that their corpses should be cast into a well, which is now marked with a beautiful statue in their memory. A long series of engagements against Nana Sahib followed, in which he was always the loser; and he was ultimately driven beyond the English frontier into Nepal in 1859, where he probably perished in the jungle. On Oct. 21, 1874, a man supposed to be Nana Sahib was captured at Gwalior, but the identity was disproved. Consult Perceval Landon, *Under the Sun, Impressions of Indian Cities, with a Chapter Dealing with the Later Life of Nana Sahib* (London, 1906), and James Burgess, *The Chronology of Modern India, 1494–1894* (Edinburgh, 1913).

NANCHANG, nän'chäng'. The capital of the Province of Kiangsi, China, situated at the head of the delta formed by the Kan-kiang at its entrance into Poyang Lake, about 175 miles southeast of Hankow (Map: China, L 6). It is an important centre of the porcelain trade and for small manufactures. The city is surrounded by an alluvial plain of great fertility. Pop. (est.), 150,000.

NANCRÈDE, năn-krĕd', C(HARLES) B(EYLARD) GUÉRARD DE (1847–). An American surgeon, born in Philadelphia. He studied at the University of Pennsylvania and at Jefferson Medical College (M.D., 1883) and early practiced in his native city, holding various surgical

chairs and hospital appointments. After 1889 he was professor of surgery and clinical surgery and surgeon of the university hospital at the University of Michigan, and from 1900 to his retirement in 1913 also held a chair. During the Spanish-American War he served at the front as a surgeon. In 1908–09 he was president of the American Surgical Association. Among his writings are *Lectures upon the Principles of Surgery* (1899; 2d ed., 1905) and the following essays: "Injuries and Diseases of Bursæ" (1882); "Some of the Facts of Listerism" (1882); "Recent Advances in Surgery of the Brain and its Coverings" (1888); "The Laws of Physics and Ballistics the True Explanation of the Lodgment and Deflection of the Majority of Modern Small-Arm Projectiles, not the Ricochet Hypothesis" (1903). Nancrède also contributed interesting essays to a number of medical works.

NANCY, năn′sē′. The capital of the Department of Meurthe-et-Moselle, France, and an important railroad junction, 220 miles east of Paris and 94 miles west of Strassburg, on the left bank of the Meurthe, 6 miles above its junction with the Moselle (Map: France, N., M 4). It is a strongly fortified and well-built city, with fine squares, broad streets, and imposing edifices. The city owes much of its architectural ornamentation to Stanislas Leszczynski, King of Poland, who resided here as Duke of Lorraine. His statue stands in the Place Stanislas, the most important square in the city, which separates the old city on the northwest from the newer quarters on the southeast. It is surrounded by imposing edifices, including the theatre, the Hôtel de Ville, and the Episcopal Palace.

The Hôtel de Ville, dating from the seventeenth century, contains a fine ballroom with mural paintings by Girardet and fine galleries with paintings by Rubens, Van Ruysdael, and other noted masters. The Ducal Palace has been largely destroyed, but the single remaining wing is a good example of the Gothic style and holds the Musée Lorraine, a collection of historical and other antiquities. The cathedral of Notre Dame, a creation of the famous Mansart, is not of special interest, but the fifteenth-century church of the Cordeliers, attached to the Ducal Palace, has many fine monuments of the dukes of Lorraine. The church of Bon Secours contains the tomb of Stanislas. Nancy has seven fine triumphal arches, the most elaborate one being the Porte Royal, constructed under Louis XV. Among other structures of note are the Gothic church of Saint-Epvre, an ancient Gothic castle, and the Palais du Gouvernement, now used for military purposes.

Nancy has a university (see below), a noted school of forestry (the only one in France), a training college, an ecclesiastical seminary, a school of commerce, a conservatory of music, a botanic garden, a public library of over 142,000 volumes and 2127 manuscripts, and is the headquarters of one of the two French schools of hypnotism. There are numerous learned societies. Attached to the school of forestry is a valuable forestry museum. It is the seat of a bishop and the headquarters of the Twentieth Army Corps.

The situation of Nancy on the Eastern Canal and the Rhine-Marne Canal gives it a large trade. Its principal manufactures are tobacco, machinery, embroidery, hardware, boots and shoes, straw hats, gloves, macaroni, chemicals, candles, glass, woolen goods, and agricultural implements. The great breweries here are among the most important in France. Not a few of the artistic specialties in furniture and in printing in France originated here. To facilitate traffic, a belt-line railway has been built. Pop., 1901, 102,559; 1911, 119,949.

Charles the Bold was overwhelmed and slain before the gates of Nancy in 1477 in battle against René of Lorraine and his Swiss mercenaries. Nancy was the seat of the dukes of Lorraine down to 1766, in which year it came to France. It was occupied by the Germans in 1870 and forced to pay a large ransom. The town grew greatly in general importance after the loss of Alsace-Lorraine by France, large numbers of Alsatians coming here to live. Nancy was unsuccessfully attacked by the land and aërial forces of the Germans during the European War which broke out in 1914. See WAR IN EUROPE.

NANCY, UNIVERSITY OF. One of the leading universities of France, founded originally at Pont-à-Mousson. It had its inception in the Papal Bull of 1572, issued at the instance of the Cardinal of Lorraine, and consisted at first of two faculties, theology and arts. It was surrendered to the Jesuits to combat heresy. A law faculty was added in 1582 and a medical faculty in 1598. The university maintained a steady growth, and in 1608 its attendance reached about 2000. This growth was checked by the wars of the seventeenth century. In 1768 it was removed to Nancy by the order of Louis XV. During the stormy days of the French Revolution it went down with the rest of the French universities, but was not reorganized at the establishment of the University of France. In 1852, at the instance of 40 municipalities, a rectorate was established, and in 1854 the faculties of letters and science were organized. In 1864 the faculty of law and in 1871 the faculty of medicine, consisting mostly of professors who had come over from Strassburg University, were established. Until 1896 these were known as Facultés de Nancy and were under the control of the University of France; but with the dissolution of that university Nancy became autonomous. The University of Nancy consists of the faculties of law, medicine, sciences and letters, and the school of pharmacy. It also includes the chemical, serotherapic, electrotechnic, and agricultural and colonial institutes. The attendance in 1913 was 2248, about one-third of the students being enrolled in the faculty of sciences. The library contains 107,254 volumes and about an equal number of dissertations.

NANDA DEVI, nŭn′də dā′vē. A peak of the Himalaya (q.v.).

NANDU, nän′dōō. The Brazilian name of the South American ostrich. See RHEA.

NANEK, nä′nĕk, or **NANAK,** nä′nək (1469–1538). Founder of the religious sect of Sikhs (q.v.). He was born at the village of Talwandy, now called Nankana, on the bank of the river Ravi, near Lahore, India, and was a Kshatriya in caste. In his youth he showed a tendency towards mysticism. He was at first a shepherd and afterward became a government official, in charge of the state's granary. He visited all the sacred places of India for the purpose of formulating the religious system he wished to introduce among his neighboring

tribes. He spent two years in the town of Livanobbhon, where he associated himself with Kabir, the founder of a monotheistic sect. It was due to the influence of Kabir, whom Nanek often quotes in his book, that he determined to found a similar sect. Having previously made pilgrimages to Mecca and Medina, he returned to India, where he compiled the great work known as the *Adi-Granth*. For many years he traveled widely and proclaimed everywhere the doctrines of his new religion. He preached the abolition of caste, the unity of God, and the obligation to lead a pure life, and soon had a large following. Upon his death, which occurred in October, 1538, at Kartarpur in the Jalandhar Dob, his disciple Angad or Lakanā assumed the leadership of the sect. Ten apostles, or gurus as they are termed, are traced from Nanek down to Govind Sinh in 1708, with whom the succession stopped. Consult: J. D. Cunningham, *History of the Sikhs* (London, 1849); Ernst Trumpp, *The Adi Granth or the Holy Scriptures of the Sikhs* (Leipzig, 1881); Sir J. J. H. Gordon, *The Sikhs* (London, 1904); M. A. Macauliffe, *The Sikh Religion: Its Gurus, Sacred Writings, and Authors* (6 vols., ib., 1909).

NANGASAKI, nän'gȧ-sä'kē. A seaport of Japan. See NAGASAKI.

NANINI, nȧ-nē'nē, GIOVANNI MARIA (c.1540–1607). An Italian composer, born at Tivoli. He opened the first public school of music ever controlled by an Italian musician in Rome. The famous Palestrina and a nephew, Bernardino, were two of his assistants. He succeeded Palestrina as maestro at Santa Maria Maggiore in Rome and in 1577 became a member of the papal choir. Three years before his death he was appointed maestro di cappella of the Sistine Chapel. A six-part motet, *Hodie nobis Cœlorum Rex*, composed by him is sung annually on Christmas morning in the Sistine Chapel. Some of his most important works remain in manuscript and are the private property of the Sistine Chapel and the Vatican Library. His printed works include motets, madrigals, canzonets, and Church pieces, most of which examples are regarded as representing the best of the Palestrina period. He died at Rome. Consult Giuseppe Radiciotti, *Giovanni Maria Nanini* (Pesaro, 1906).

NA'NISM (from Gk. *νᾶνος, nanos*, dwarf). In plants the condition of inherent dwarfness. It is a transmitted character, and plants possessing it have only dwarf offspring. Sometimes such dwarf plants have appeared suddenly, but have reproduced true to seed, giving rise to a new race of small individuals such as is seen in a mutant from the evening primrose (*Œnothera lamarckiana*). The original plant appeared in the cultures of Hugo De Vries, was much smaller than its parent, and, producing offspring like itself, became known as a new species (*Œnothera nanella*). Among alpine plants some are inherently dwarf, illustrating nanism, while others develop into tall plants under favorable conditions. See DWARF; ALPINE PLANT; ARCTIC REGION; MUTATION.

NANKEEN'. A fabric which was formerly exported extensively from China and was said to be the manufacture of Nanking; the natural color of the *Gossypium religiosum* fibre, from which it was made, a yellowish buff, being a favorite one. In the middle of the nineteenth century this material was much used for clothing, especially for trousers. Lately nankeen has been largely superseded by ordinary cotton, which is artificially colored to imitate the genuine fabric.

NANKING' (Chin., southern capital). The capital of the Province of Kiangsu, China. It is 194 miles northwest of Shanghai, near the Yang-tse River, in lat. 32° 40′ N. and long. 118° 47′ E. (Map: China, L 5). It was made the capital of the Empire and called Nanking in 1368, but was the capital only until 1403. Its official name under the Manchu dynasty was Kiangning. It is an ancient city, having been the capital of its province as far back as 317–582 A.D. It was famous as a literary centre and for its fine arts, manufactures, and monuments. It was captured by the Taiping rebels in 1853, who held it for more than a year. They destroyed the beautiful porcelain tower from fear of its geomantic influences and so injured the city that it has not yet recovered fully. The first British treaty was signed in Nanking in 1842. Its present importance in part is from its military college, arsenal, and factories for the making of war material. It is a centre of missionary activity. The climate is exceedingly unhealthful. The population is estimated at 267,000 according to the customs estimate of 1910. It was opened to foreign trade in 1899, but its commercial importance suffers from its proximity to Chinkiang (q.v.). In the vicinity are the famous Ming tombs. In 1913 the net imports amounted to 6,437,554 hk. tls., and the exports to 1,687,787 hk. tls.

NAN'NING'. A treaty port of south China, in the Province of Kwangsi, situated at the head of navigation on the Yu-kiang River, 320 miles west by south of Canton (Map: China, J 7). It is one of the principal trading stations near the south frontier and is one of the open ports. In 1913 the imports amounted to 3,260,000 hk. tls., and the exports to 1,009,132 hk. tls. The city as a trade centre is second in importance to Wuchow and is clean and well ordered, with numerous educational and banking establishments. Pop., 37,000.

NAN'NINOSE (corruption of American Indian *mananosay*), or **MAN'NINOSE.** A local name in use along the South Atlantic coast for the soft clam (*Mya arenaria*). See CLAM.

NANSEN, nän'sen, FRIDTJOF (1861–). A Norwegian Arctic explorer, naturalist, and author, born near Christiania, Norway. He was educated in the University of Christiania and was trained as a zoölogist. In his twenty-first year he undertook a trip to East Greenland waters for zoölogical specimens; the same year he was appointed curator in the Natural History Museum at Bergen. He became known to the world as the first man to cross the ice cap of Greenland, an adventurous journey from the east to the west coast, undertaken in 1888, which he described in two volumes, *The First Crossing of Greenland* (1890). He spent the winter of 1888–89 among the West Greenland natives, which resulted in a volume on *Eskimo Life* (1893). After his return to Norway he was appointed curator in the Museum of Comparative Anatomy at Christiania University, where he became professor of zoölogy in 1897 and after 1907 was professor of oceanography. From his twenty-third year he was constantly planning for the great journey into the polar regions, upon which he did not embark till 1893. He had unusual natural and acquired qualifications for the work, and his winter among the

Eskimo was of inestimable value to him in his later experiences.

Nansen inferred, partly from the appearance in Greenland of a pair of trousers which had been left upon the ice north of Siberia when the *Jeannette* was abandoned, partly from the presence in Greenland of driftwood from Siberia, and partly from the experience of other explorers, that a ship driven with the ice by prevailing winds might drift from above Siberia across or near the pole. The weight of Arctic authority did not support this idea; nevertheless, with the assistance of the government and private citizens, Nansen built and equipped the Arctic exploring vessel *Fram* (Forward), left Norway in 1893, skirted the north coasts of Europe and Asia, put into the polar pack ice near the New Siberia islands on Sept. 22, 1893, and drifted northwest till March 14, 1895. On that day, with a single companion, Lieutenant Johansen, he left the *Fram* frozen in the pack and started towards the Pole with dog sledges. On April 7, 1895, he reached lat. 86° 14′ N., within 272 statute miles of the North Pole and 184 miles nearer to it than any man had ever been before him. Further progress was impossible, and he retreated to Franz Josef Land, where he and Johansen spent the winter in a snow hut, living on Arctic game.

In the spring they started southward for Spitzbergen, but fortunately found the winter camp of the Harmsworth expedition under Jackson and returned home on the ship of that party, reaching Vardö, Norway, Aug. 13, 1896. Meanwhile the *Fram* drifted around to the north of the Franz Josef Land archipelago, reaching lat. 85° 57′, then blasted her way southward to open water, and reached Vardö within a week after Nansen's arrival there. Nansen wrote: *Farthest North* (2 vols., 1897; new ed., 1897), a popular description of the expedition and a classic in the literature of travel (translated into many languages); *The Norwegian North Polar Expedition, 1893–96: Scientific Results* (6 vols., 1900–06); *Die norwegischen hydrographischen Untersuchungen im Nordmeere* (1906), with B. Helland-Hansen; *The Norwegian Sea: Its Physical Oceanography* (1909); "Videnksab og Moral," in *Samtiden* (1908); *In Northern Mists: Arctic Exploration in Early Times* (2 vols., 1911); *Through Siberia, the Land of the Future* (2 vols., 1914); and numerous articles in scientific journals.

Nansen found no form of life above the eighty-fourth parallel. His discovery of a wide sea of oceanic depth north of the New Siberia islands overthrew the theory of the prevailing shallowness of the Arctic Ocean. He discovered no land except a few little islands near the Asian coast; and the free movement of the ice masses, driven, as Nansen observed, by the winds in every direction, has led some geographers to conclude that there is no large land near the North Pole. (See POLAR RESEARCH.) In oceanography Nansen did work of great importance. On his initiative there was organized in 1892 the International Commission for Systematic Study of the Ocean, having headquarters in Copenhagen and laboratories in Christiania. Of the laboratories he was director till 1908. Also prominent in a political connection, especially in the movement which led to the separation of Norway and Sweden, Nansen wrote on this subject *Norway and the Union with Sweden* (1905; also in Norwegian, German, and French). To the *Times* (London), the *Temps* (Paris), and to German papers he contributed political articles. From 1906 to 1908 he served as Norwegian Minister to Great Britain. Consult Frederick Dolman, *Dr. Nansen: The Man and his Work* (London, 1897), and W. C. Brögger and Nordahl Rolfsen, *Fridtjof Nansen, 1861–93*, English translation by William Archer (ib., 1906).

NANSEN, HANS (1598–1667). Burgomaster and President of Copenhagen, born at Flensborg. He entered the Icelandic Company, made many commercial journeys to north Russia and Iceland, and became wealthy. In 1639 he was made councilman of Copenhagen and in 1644 burgomaster. During the serious events of 1658–60 the burghers placed their confidence in him, and he came to have influence with the King, as shown by his participation in the change of government in 1660. On his advice the burghers of Copenhagen decided to offer the King the hereditary government; but it seems certain Nansen did not want despotism introduced. In 1660 he was made President of Copenhagen and in 1661 member of the Supreme Court.

NANSEN SOUND. See HEIBERG LAND.

NANTERRE, nänˈtârˈ. A town of France in the Department of Seine, situated at the foot of Mount Valérien, a few miles west of Paris. According to the tradition, it is the birthplace of St. Geneviève, the patron saint of Paris. It manufactures chemicals and aluminium. Pop. (commune), 1901, 14,140; 1911, 21,349.

NANTES, nänt. An important seaport town, the largest city of Brittany, and the capital of the Department of Loire-Inférieure, France, situated on the right bank of the Loire, 35 miles from the sea and 250 miles by rail southwest of Paris. Here the Erdre and the Sèvre Nantaise join the Loire (Map: France, N., D 5). There is communication with the interior on the Loire and the canal to Brest. This handsome and well-built city has many striking and beautiful buildings, among them the cathedral of St. Pierre with beautiful monuments. The modern Bourse is one of the finest buildings in France. There are a public library containing 210,000 volumes, a museum of paintings and fine arts with works of modern French masters, a museum of natural history, an ecclesiastical college, a training college for girls, a school of medicine and pharmacy with a library of 25,000 volumes, also colleges of law, dentistry, music, art, navigation and technical subjects, several learned societies, and three theatres. A beautiful promenade, formed by the Cours St. Pierre and the Cours St. André, extends from the Erdre to the Loire. It is planted with four rows of trees, bordered with lines of palatial houses, and ornamented with statues. On the banks of the river there are 5 miles of quays. Formerly vessels of 200 tons only could reach the port, but a ship canal on the left bank now admits sailing vessels and steamers of 20-foot draft directly to Nantes. In 1914, $5,500,000 was spent in harbor improvements. In the manufacture of sugar Nantes stands next to Paris and Marseilles, its shipbuilding industry and its tobacco factories are important; there are also iron, copper, and lead foundries, oil and soap works, food-preserving establishments, saw mills, and manufactures of railroad material, of cotton and woolen goods, chemicals, tiles, leather, rope, wood pulp, brushes, glass,

chocolate, and cement. It is the seat of a bishop and the headquarters of the Eleventh Army Corps.

Nantes, anciently Condivincum, was founded before the Roman conquest. It took its present name from that of a Gallic tribe, the Namnetes. It was the capital of the Duchy of Brittany, and its history until the fifteenth century is a record of struggles with successive invaders in defense of its independence. In 1491 the duchy was united to France by the marriage in the castle of Anne of Brittany to Charles VIII, King of France. The castle also witnessed the signing of the famous Edict of Nantes (q.v.) by Henry IV in 1598. From the fifteenth century the commerce of the town began to develop, and in the seventeenth and eighteenth centuries its prosperity increased on account of the slave trade, but by 1790 Nantes had declined greatly in importance. During the Revolution it was the scene of the *noyades* and other atrocities of the infamous Carrier (q.v.). Pop., 1901, 132,990; 1911, 170,535. Consult: E. Maillard, *Nantes et le département au XIXème siècle* (Paris, 1891); F. Lebaudière, *Histoire de Nantes sous le règne de Louis-Philippe, 1830–48* (ib., 1900); G. Durville, *Etudes sur le vieux Nantes* (ib., 1900–01); E. Destranges, *Le théâtre à Nantes depuis ses origines jusqu'à nos jours, 1430–1901* (ib., 1903).

NANTES, Edict of. The name given to the famous decree signed in the city of Nantes by Henry IV of France, April 13, 1598, which secured to the Protestant portion of his subjects partial freedom of religion. The document consisted of 95 patent or public articles and 56 secret or close ones, and among its chief provisions were the following: the proclamation of a full amnesty; the granting of liberty of conscience to the Huguenots; the permitting to Huguenot chiefs and noblemen of public religious exercises attended by themselves, their families, and the families of their dependents. In addition the Huguenots were to be allowed to establish new churches, except in Paris and the surrounding districts and in the royal residences, and to maintain universities, or theological colleges, of which the Huguenots had four, those at Montauban, Saumur, Montpellier, and Sedan. Adherents of the reformed faith were also to be eligible to all civic offices and dignities, but they were obliged outwardly to celebrate the festivals of the Catholic church and to pay tithes to the Catholic priesthood. In each Parlement a *chambre de l'édit* was created to take cognizance of all cases arising out of the act and to supervise its working. Owing to the difficulties and delays in registering the Edict of Nantes, it was not published until a year after it had been signed by the King. It remained in force until revoked by Louis XIV in October, 1685. See Huguenots.

NANTEUIL, năn'tē'y', Robert (1630–78). A French portrait engraver, born at Rheims. He studied in his native city under Nicolas Regnesson. About 1648 he went to Paris and there perfected himself in the use of crayon and pastel. He drew his portraits from life as well as engraved them, and soon attained great popularity. His plates having come to the King's notice, he was appointed designer of the cabinet (1658), and at his demand Louis XIV issued the decree of 1660, dated from St. Jean de Luz, by which engraving was raised to the status of a fine art. He also exercised a strong influence over the school of engraving established by the King. After his death Nanteuil suffered neglect, and has only recently been recognized as one of the greatest portrait engravers of all time. He confined himself to heads, many of them life size, which show rare precision of draftsmanship, masterly modeling, and convincing characterization. They are simply composed and possess decided color and great fullness of tone. He left over 200 plates, including 11 portraits of Louis XIV, 2 of Anne of Austria, 14 of Cardinal Mazarin, and portraits of Madame de Sévigné, Colbert, Nicolas and Basile Fouquet, the Duke de Bouillon, and many other celebrities of the time. Consult Metcalfe, "Robert Nanteuil," in *Prints and their Makers* (ed. by Carrington, New York, 1912).

NAN'TICOKE. A former important Algonquian tribe of Maryland. They were noted for their dark complexion and peculiar customs and ceremonies, from which they acquired the reputation of being a tribe of sorcerers. Their power was broken by the Iroquois in 1678. In 1707 they had seven villages, and in 1722 their principal village still contained about 100 inhabitants and was the seat of an "empress," who ruled over all the neighboring Indians. The whole tribe then numbered about 500. Soon afterward they began a gradual removal to the Iroquois country, and settled in several villages on the eastern branch of the Susquehanna, in southern New York, although a portion of them continued to reside in their old country. In 1753 a part of those on the Susquehanna became incorporated with the Iroquois, but the majority removed to the Ohio and joined the Delaware tribe, with which they became completely merged. There are still several score of mixed-blood Nanticoke in southern Delaware.

NANTICOKE. A borough in Luzerne Co., Pa., 7 miles west-southwest of Wilkes-Barre, on the Susquehanna River and on the Pennsylvania, the Delaware, Lackawanna, and Western, and the Central of New Jersey railroads (Map: Pennsylvania, J 4). It is chiefly engaged in mining and preparing for market anthracite coal, but has also silk-throwing mills, hosiery mills, a canning factory, cigar factory, etc. There is a State hospital here. Settled in 1850–55, Nanticoke was incorporated in 1874; it is governed under the charter of that date, which provides for a burgess, elected every three years, and a unicameral council. Pop., 1900, 12,116; 1910, 18,877; 1914 (U. S. est.), 21,756; 1920, 22,614.

NANTUCK'ET. A town and the county seat of Nantucket Co., Mass., coextensive with Nantucket Island and several small outlying islands, 50 miles southeast of New Bedford, with which it has steamboat communication (Map: Massachusetts, G 8). Nantucket is widely noted as a summer resort, presenting much of picturesque and historic interest. It was formerly the seat of a great whaling industry, but at present the community is engaged principally in fishing and agriculture. The town, including within its corporate limits several villages, contains the Athenæum (public library), Admiral Sir Isaac Coffin's Manual Training School, a museum, and a courthouse. The government is administered by town meetings. Pop., 1900, 3006; 1910, 2962.

In 1659 the first settlers, headed by Thomas Macy, came to the island and settled at Madeket, the present site of Nantucket not having been chosen until 1673. Consult: L. S. Hinchman, *Early Settlers of Nantucket, their Associ-*

ates and their Descendants (2d ed., Philadelphia, 1902); H. B. Worth, *Nantucket Lands and Landowners* (Nantucket, 1901–10); R. A. Douglas-Lithgow, *Nantucket* (New York, 1914).

NANTWICH, nănt'ĭch. A market town and urban district in Cheshire, England, on the Weaver, 18 miles southeast of Chester (Map: England, D 3). The parish church of St. Mary and St. Nicholas is an excellent example of the Decorated and Perpendicular Style. Nantwich was famous in former times for its brine springs and salt works; the baths are still used. Shoes, gloves, clothing, cotton goods, ironware, and ale are manufactured. The town owns its water supply and markets. It is well known as a fox-hunting centre. Nantwich dates from the Roman period, and was formerly called Halen Gwyn (the white salt town). Pop., 1901, 7722; 1911, 7815.

NANTYGLO (năn'tĭ-glō) **AND BLAINA** (blā'nà). A town in Monmouthshire, England, 7 miles west of Abergavenny. It has important coal-mining and iron industries. Pop., 1901, 13,500; 1911, 15,395.

NAOGEORG, nä'ō-gĕ-ōrĸ', THOMAS (1511–63). A German Protestant dramatist, whose name in the vernacular was Kirchmeyer. He was born at Hubelschmeiss, near Straubing, possibly studied at Tübingen, and in 1535 became pastor. His Latin poems, all animated by the most bitter opposition to the papacy, include the dramas *Pammachius* (1538), *Incendia seu Pyrgopolinices* (1541), *Mercator seu Indicium* (1541), and the satiric poem *Regnum Papisticum* (1553). These were often rendered into German, and were long popular, as were his weaker biblical dramas, *Hamanus* (1543), *Hieremias* (1551), and *Judas Iscariotes* (1551).

NAÓN, nä-ōn', RÓMULO S. (1875–). An Argentine diplomat, born in Buenos Aires. He was educated in the university there and later served on the faculties of the National College and the University of Buenos Aires. Entering politics, he was elected representative in the national Congress in 1902 and six years later was made Minister of Justice and Public Instruction. In 1911 he was sent to the United States as Envoy Extraordinary and Minister Plenipotentiary, and when the Legation was raised to the rank of Embassy (1914), he became the first Ambassador. He was secretary of the Argentine delegation to the Second Hague Conference, and in 1914 was a member, with Ambassadors Da Gama and Surez, of the A. B. C. (Argentina-Brazil-Chile) Peace Conference at Niagara Falls, Ontario, which endeavored to adjust the difficulties of the United States and Mexico. For their services the mediators were thanked by Congress and given medals. Naón is author of works on political science, constitutional law, and educational subjects. As a member of the Governing Board of the Pan-American Union Naón actively promoted Pan-Americanism. He received honorary degrees from Yale, Brown, and the University of Pittsburgh.

NAOROJI, nou'rō-jĕ, DADABHAI (1825–). The first Indian member of the British House of Commons. The son of a Parsi priest, he was born at Bombay and educated in the school of that city which afterward became the Elphinstone Institution. He was appointed professor of mathematics and of natural philosophy there in 1854, but after 1855 he lived chiefly in England. He was instrumental in founding the East India Association in 1867, and three years afterward he succeeded in having certain positions in the civil service opened to native Indians. In 1874 he was made Prime Minister to the Prince of Baroda. From 1885 to 1887 he was a member of the Bombay Legislature, and he was president of the Indian National Congress in 1886, 1893, and 1906. He was a Liberal member of Parliament for Central Finsbury in 1892–95, and in 1895 was appointed a member of the royal commission to inquire into Indian affairs. His publications include: *England's Duties to India* (1867); *The Wants and Means of India* (1870), collected articles published in 1887; *Poverty and Un-British Rule in India* (1901); *Correspondence with Lord George Hamilton* (1900–01); *The Rights of Labour* (1906).

NA'OS (Gk. *ναός*, Attic *νεώς*, from *ναίειν*, *naiein*, to dwell). The central chamber of a Greek or Græco-Roman temple. See ARCHITECTURE, *Greece;* CELLA; GREEK ART, *Architecture: The Temple;* PRONAOS.

NAPA, nă'pà. A city and the county seat of Napa Co., Cal., 46 miles by rail northeast of San Francisco, on the navigable Napa River and on the Southern Pacific Railroad (Map: California, C 4). The State Hospital for the Insane is situated on the outskirts of the city, and there are several places of interest, including the Napa Soda Springs, Napa Redwoods, Calistoga Hot Springs, and petrified forests. Napa contains also a public library and a fine high-school building. The leading industries are fruit growing and the manufacture of tanned leather, shoes, gloves, wine, shirts, boxes, olive oil, and woolen goods. At Napa Junction there are Portland-cement works, the vicinity having extensive deposits of cement rock. Settled in 1847, Napa was incorporated in 1863. Pop., 1900, 4036; 1910, 5791.

NAP'ANEE'. A town, port of entry, and the capital of the united counties of Lennox and Addington, Ontario, Canada, situated on the Napanee River, 7 miles from its mouth and 28 miles by rail west of Kingston, and on the Canadian Northern and Grand Trunk railways (Map: Ontario, H 5). It possesses county buildings, a collegiate institute, a public park, race track, and its industrial establishments include flour mills, foundries, manufactories of bricks and tiles, furniture, motor boats, and carriages. Pop., 1901, 3143; 1911, 2807.

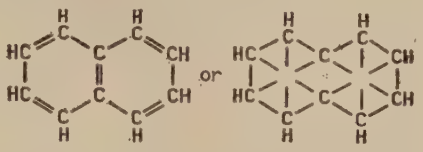
NAPATA, nà-pä'tà. The ancient capital of Ethiopia (q.v.), mentioned in inscriptions as early as 1450 B.C., and later the seat of independent kings. It was rivaled by Meroë (q.v.) after the Persian period. For the ruins of the city, destroyed by Petronius, see BARKAL.

NA'PERVILLE. A city in Dupage Co., Ill., 29 miles by rail west of Chicago, on the Dupage River and on the Chicago, Burlington, and Quincy Railroad (Map: Illinois, H 2). The city, chiefly a residential place, has the Nichols Library, Edward Sanatorium, and is the seat of Northwestern College (Evangelical Association), established in 1861, and of the Evangelical Theological Seminary. There are quarries, nurseries, and manufactories of lounges, chairs, gloves, brick and tile, and fly net. The water works and electric-light plant are owned and operated by the municipality. Naperville was settled in 1830 and was incorporated in 1857. It has adopted the commission form of government. Pop., 1900, 2629; 1910, 3449.

NAPH'TALI. According to Gen. xxx. 7–8, the fifth son of Jacob and the second born to him by Bilhah. In the actual history of Israel the tribe Naphtali plays but a minor part. Its territory lay in the north, bordering on the Sea of Galilee and Lake Merom, which is probably referred to in Deut. xxxiii. 23, where the Masoretic text has the impossible Darom. (See MEROM.) According to Judg. iv. 6, Barak came from Kedesh in Naphtali, but it is doubtful whether the addition "Naphtali" is correct here, though both the clans Naphtali and Zebulon were involved in the struggle against the King of Hazor. (See DEBORAH.) According to Josephus (*Wars*, iii, 3, 2) the Naphtalites were men of valor. Their dangerous position as a border tribe made them among the first to fall into the hands of Tiglath-pileser IV of Assyria (734 B.C.; cf. 2 Kings, xv. 29). In the religious development of Israel the tribe plays no part, but in the postexile period Tiberias (q.v.), on the western shore of the Sea of Galilee, comes into prominence, and after the destruction of Jerusalem it became one of the centres of Jewish learning. Ancient and modern writers alike praise the soil and the climate of the territory of Naphtali.

NAPHTHA, năf'thȧ (Lat., from Gk. *νάφθα*, Av. *napta*, Pers. *naft*, moist; connected with Lat. *Neptunus*, Neptune, name of the sea god). A term originally applied to an inflammable liquid which exudes from the soil in certain parts of Persia. Subsequently the use of the term spread to include some of the more volatile oils found in Europe and even in America. The product of the oil fields of southern Russia is usually called naphtha, although it differs in no way from the ordinary grades of petroleum. Naphtha properly includes the lighter oils which pass off first in the distillation of petroleum, the gravities ranging from 90 to 62 degrees Baumé. Pennsylvania crude oil contains from 8 to 20 per cent of naphtha. In the refining of such naphtha several products are obtained by fractional distillation; those which pass off first, viz., rhigolene and cymogene, are gases at ordinary temperatures and are seldom saved. The next product is known as gasoline, a material largely used in machines and for illuminating purposes. After this come stove naphtha and gas naphtha, the latter being the base of much of the illuminating gas now made. Petroleum naphtha is often treated with chemicals to deodorize it. Naphtha may also be obtained in the distillation of wood and coal tar. See PETROLEUM.

NAPH'THALENE (from *naphtha* + *alcohol*), $C_{10}H_8$. A crystalline solid chemical compound of carbon and hydrogen, found abundantly in coal tar (q.v.). The crystalline mass obtained from this source is pressed, warmed with a solution of caustic soda, next washed with hot water, then heated with a little strong sulphuric acid, thoroughly washed again with water, and finally distilled in a current of steam or subjected to a process of sublimation. When thus obtained in the pure state, naphthalene melts at 80° C. (176° F.), and boils at 218° C. (424° F.). It has a peculiar characteristic odor, is insoluble in water, but freely soluble in ether and in hot alcohol. It is largely used in the manufacture of coloring substances and to some extent also as an enricher for ordinary illuminating gas. The molecule of naphthalene is composed of two rings of carbon atoms, with hydrogen atoms attached to them, and its constitution is represented by either of the following graphic formulas:



A number of interesting derivatives of this hydrocarbon are obtained by the action on naphthalene of chlorine, nitric acid, etc. The most important derivatives commercially are the so-called sulphonic acids. By acting on naphthalene with an excess of sulphuric acid we obtain naphthalene-sulphonic acid, $C_{10}H_7SO_3H + H_2O$, from which, by substitution processes, a large number of compounds are produced, many of these finding employment in the color and dye industry.

NAPHTHOL (năf'thōl) **YELLOW.** See COAL-TAR COLORS.

NAPIAS, nȧ'pyȧ', HENRI (1842–1901). A French physician, born in Sézanne, Marne. He studied medicine in Paris, graduating in 1870. Settling in the French capital, he filled several hospital offices, becoming a member of the Académie de Médecine and serving as president of the Assistance Publique. Among his books and essays, which number nearly 100 and which deal mostly with public hygiene, may be mentioned: *Des moyens de diminuer les dangers qui resultent pour les travailleurs des différentes industries de l'emploi des substances minerales toxiques* (1878); *Manuel d'hygiène industrielle* (1882); *L'Hygiène scolaire en France, etc.* (1887); *L'Hygiène des crèches* (1891); *Hygiène hospitalière et assistance publique* (1893); *Réglementation des crèches publiques et privées* (1898).

NAPIER, nā'pĭ-ēr. The capital and chief port of Hawke's Bay County and Provincial District, North Island, New Zealand, on the east coast (Map: New Zealand, N. I., C 6). Wool is the chief export; there are also large exports of timber, canned and frozen meats. The principal public buildings comprise the town hall, a hospital, lunatic asylum, and athenæum. The Anglican cathedral of St. John, the seat of the Bishop of Waiapu, is one of the finest churches in New Zealand; it was built in 1888 of brick, in the early English style. Napier has railway communication with Wellington and New Plymouth. Pop., 1901, 9015; 1911, 10,537 and including the suburbs which lie to the north of the town, 11,736. The population of the provincial district, excluding Maoris, was 48,546 in 1911.

NAPIER, ARTHUR SAMPSON (1853–1916). An English philologist, born in Cheshire. He received his early education at Rugby, attending later Owens College, Manchester, and Exeter College, Oxford, where he was granted the degree of doctor of letters. From 1878 to 1882 he was reader of English at the University of Berlin, where, having continued his studies, he took the Ph.D. at the end of this period. After three years as professor of English at the University of Göttingen, in 1885 he was elected Merton professor of English at Oxford, and in 1903 also Rawlinson professor of Anglo-Saxon in the same institution. He became a fellow of the British Academy and received

honorary degrees from Manchester and Groningen. His publications include: *Ueber die Werke des altenglischen Erzbischofs Wulfstan* (1882), his doctoral dissertation; *Wulfstan-Sammlung der ihm zugeschriebenen Homilien* (1883); *History of the Holy Rood-Tree* (1894), for the Early English Text Society; *Crawford Collection of Early English Charters* (1895), with Stevenson; *Old English Glosses* (1900); *The Franks Casket* (1901); besides many contributions to learned reviews.

NAPIER, nāp'yĕr *or* nâ-pēr', Sir Charles (1786–1860). A British admiral. His father was the Hon. Capt. Charles Napier, R.N., second son of Francis, fifth Lord Napier. He was born at the family seat, Merchiston Hall, Stirling, Scotland, March 6, 1786. At 13 he went to sea as a naval volunteer. He was made a lieutenant in 1805, took part in an important engagement in the West Indies in March, 1806, received command of the *Recruit*, 18 guns, in 1808, and in an engagement with the *Diligent* his thigh was broken. He was put on half pay for a time, but volunteered in the Peninsular army and was wounded at Busaco. In 1814 he was ordered to America and took an active part in the operations against Baltimore. In 1829 he received the command of the *Galatea*, a 42-gun frigate, and was employed "on particular service" on the coast of Portugal. He accepted the command of the fleet of Dom Pedro, the father of the young Queen, Maria da Gloria, in the struggle against her uncle, Dom Miguel, and by defeating the Miguelite fleet hastened the downfall of the usurper. He was made admiral in chief of the Portuguese navy, but soon returned to England. In the war between the Porte and Mehemet Ali he organized a land force, with which he stormed Sidon and defeated Ibrahim Pasha among the heights of Mount Lebanon. He took part in the naval attack on Acre. He next blockaded Alexandria and concluded a convention with Mehemet Ali. For these services he was knighted, and in 1847 he received the command of the Channel fleet. When the Russian War broke out he was sent out to command the Baltic fleet, but had to content himself with a prudent and successful blockade of the strongly fortified ports, which somewhat disappointed public expectations of more daring achievements. He twice sat in Parliament and until his death labored with success to reform the British naval administration. He was a man of great personal courage and decision of character, but selfish, vainglorious, and arrogant. These traits are strongly marked in his works: *The War in Portugal* (1836); *The War in Syria* (1842); *The Navy: Its Past and Present State* (1851). Partiality marks the biography by his stepson Gen. Elers Napier, *The Life and Correspondence of Admiral Sir Charles Napier* (London, 1862).

NAPIER, Sir Charles James (1782–1853). A celebrated British general, son of Col. George Napier. He was born at Whitehall, Aug. 10, 1782, and in his twelfth year received a commission in the Thirty-third Infantry. His first military experience was in Ireland in 1798. His next active service was in Spain during the Napoleonic wars, and he commanded the Fiftieth Infantry at Coruña, where he was wounded and taken prisoner. Marshal Ney dismissed him on parole, and he went to England, but returned in 1810 to the Peninsula after having been exchanged. At Coa he fought as a volunteer and had two horses killed under him. At Busaco a shot in the face broke his jaw and injured an eye; but he recovered in time to be present at the battle of Fuentes de Oñoro and the second siege of Badajoz, both in 1811. In the summer of 1813 he was with the fleet under Beckwith, and afterward under Cockburn, engaged in desultory operations on the coast of the United States. In 1815 he took part in the storming of Cambrai, and marched into Paris with the allied armies. From 1822 to 1830 he was Resident (Governor) of Cephalonia, one of the Ionian Islands, the affairs of which he administered with great energy and intelligence. In 1841 he was ordered to India to take command of the army at Bombay. The most splendid service of his life now began, and resulted in the conquest of Sind against great odds. In the battle of Miani, 1843, Napier with about 3000 troops attacked a strongly posted native force ten times as great, and defeated it, killing more than 6000 men. Thereupon all the ameers surrendered with the exception of Shir Muhammed, who brought 25,000 men into line of battle at Hyderabad. In three hours Napier's little army of 5000 men gained a decisive victory, and a few days afterward the English general was master of Sind. The Governor-General, Lord Ellenborough, made him Governor of the conquered territory, but though his administration was very successful, as were also various campaigns against the hill tribes. Napier retired in 1847, after having quarreled with the directors of the East India Company. During the Sikh War of 1848–49 he again went to India, but arrived too late to take part in the conflict. After having put down a mutiny among the native soldiers, he returned to England in 1850, having quarreled with the Governor-General, Lord Dalhousie. He retired to the Hampshire Downs, near Portsmouth, busying himself with literary labors. There he died on Aug. 29, 1853. Napier was a man brave to rashness, quarrelsome with his superiors, but beloved by his soldiers, and one of the most remarkable of the military men of his time. He wrote: *The Colonies: Treating of their Value Generally, of the Ionian Islands in Particular* (1833); *Colonization, Particularly in Southern Australia: With Some Remarks on Small Farms and Overpopulation* (1835); *Remarks on Military Law and the Punishment of Flogging* (1837); *Defects, Civil and Military, of the Indian Government* (1853). Consult: W. F. P. Napier (brother), *The Life and Opinions of General Sir Charles Napier* (4 vols., London, 1857); W. N. Bruce, *Life of General Sir Charles Napier* (ib., 1885); T. R. E. Holmes, *Four Famous Soldiers* (ib., 1889); W. F. Butler, *Sir Charles Napier* (ib., 1890).

NAPIER, Sir Francis, Baron Ettrick (1819–98). A British diplomat and administrator, born at Thirlestane in Selkirkshire, Scotland. He was educated at Trinity College, Cambridge, entered the diplomatic service in 1840, was attaché at Vienna and at Constantinople, Secretary of Legation at Naples, Envoy at Washington and The Hague, and Ambassador to St. Petersburg (1860–64) and at Berlin (1864–66). At Naples, Berlin, and St. Petersburg he acted with a tact, firmness, and suavity that smoothed over or straightened out difficult situations. The British government, convinced of his ability in other fields, transferred him in 1866 from Berlin to India as Governor of

Madras, where he remained for six years. His administration of this presidency was specially able in measures for the prevention of famine and disease. In the latter he was assisted by the experience of Florence Nightingale (q.v.), with whom he had a lengthy correspondence. He also completed irrigation works then partly finished and devised others which were afterward constructed. He met the famine in Ganjam, in the northern part of Madras, with prompt relief. As head of the senior presidency he did much to soften the often strained relations between the central and the minor governments of India. The assassination of the Earl of Mayo (q.v.) in 1872 made Napier Governor-General of India for a few months, after which he returned to England and was made a peer of the United Kingdom, Baron Ettrick of Ettrick. He was expected to attain high office, but lack of a private fortune hampered his political ambitions and restricted his activity to social and charitable work. He died suddenly at Florence.

NAPIER, JOHN (1550–1617). A Scottish mathematician, born at Merchiston, now a part of Edinburgh. He was educated at St. Andrews and probably also abroad. His natural pugnacity of character often involved him in difficulties with his neighbors and tenants. In 1594 he published his *Plaine Discovery of the Whole Revelation of St. John* (2d ed., London, 1611), in which he sought to prove that the Pope was Antichrist. In somewhat the same spirit, ostensibly to defend his country from "the enemies of God and true religion," he made some secret inventions, including burning mirrors, a piece of artillery, and a chariot of metal, none of which had any more merit than his theological contributions. Napier's fame rests on his mathematical discoveries, and he is chiefly known as the inventor of logarithms (q.v.). In his earlier investigations he seems to have been considering the subject of imaginary roots, and he refers to this as an important algebraic secret. The idea of logarithms seems to have occurred to him as early as 1594, and thenceforward the rest of his life was spent in developing the idea and computing logarithmic tables. He also invented some mechanical devices for computation, known as Napier's rods. (See CALCULATING MACHINES.) By means of these multiplication and division can be performed, and square and cube roots extracted. He was also the inventor of a number of formulas in trigonometry, known as Napier's circular parts. (See CIRCULAR PARTS.) Napier was one of the first English writers to make any valuable contribution to mathematics, and his discoveries mark an epoch in the history of science. His chief writings are: *De Arte Logistica* (written in 1573, published in 1839); *Mirifici Logarithmorum Canonis Descriptio* (1614 and subsequent editions; Eng. trans., 1616 and 1857); *Mirifici Logarithmorum Canonis Constructio* (1619; Eng. trans., 1889); *Rabdologiæ seu Numerationis per Virgulas Libri Duo* (1617). Consult: Earl of Buchan, *Life of Napier* (Edinburgh, 1787); Mark Napier, *Memoirs of Napier* (ib., 1793); Gibson, *Napier and the Invention of Logarithms* (Glasgow, 1914), an address published in the *Proceedings* of the Royal Philosophical Society of Glasgow; E. W. Hobson, *John Napier and the Invention of Logarithms 1614* (Cambridge, 1914). A complete edition of Napier's works appeared in Edinburgh in 1839. A bibliography of Napier's works, by Macdonald, may be found in the English translation of the *Mirifici Logarithmorum Canonis Constructio* mentioned above. In July, 1914, a tercentenary commemoration of the publication of the *Canon* was held at Edinburgh, and the published papers contain some valuable information as to the works of Napier.

NAPIER, ROBERT (1791–1876). A British marine engineer, born at Dumbarton, Scotland. He was for a time apprenticed to his father, a blacksmith, and afterward went to Glasgow, where in 1815, after working for Robert Stevenson (q.v.), he set up a smithy, with two apprentices. In 1823 he built his first marine engine. In 1830 he supplied engines for the Glasgow Steam Packet Company, and 10 years later he supplied the Cunard Company with engines for their first four steamers. His first negotiations were with Samuel Cunard only, but as the latter could not meet the expense necessary to build engines large enough, that fact led to the seeking of additional funds and thence to the origin of the Cunard Company. Napier added shipbuilding to the construction of engines in 1841. He built the *Persia* for the Cunard Company in 1854, the *Black Prince*, one of the two earliest ironclad warships, for the British government in 1860, and afterward over 300 vessels, some of them warships for the British and other European governments.

NAPIER, ROBERT CORNELIS, LORD NAPIER OF MAGDALA (1810–90). A British soldier, born at Colombo, Ceylon. He studied at the East India Company's military college at Addiscombe and at the royal engineering school at Chatham, and from 1828 to 1845 was chiefly employed on the public works. In the latter year, however, he participated in several battles of the First Sikh War. During the Second Sikh War (1848–49) he again saw active service, and at its close was appointed civil engineer to the Board of Administration of the Punjab, in which capacity he inaugurated and partly carried out a comprehensive scheme of public improvements. During the summer and fall of 1857, at the time of the Mutiny, Napier distinguished himself in the movements which resulted in the relief of Lucknow. Later he also planned the recapture of that place. In June, 1858, he coöperated with Sir Hugh Rose in the latter's operations against the insurgent forces under Tantia Topi and the Ranee of Jhansi; and on the 29th, after Sir Hugh's departure, he took the chief command in Central India. In August he coöperated with Brigadier General Smith in the capture of Paori; in December, with slight loss to himself, destroyed Ferozeshah's army, and in April, 1859, captured Rajah Man Singh of Narwar and Tantia Topi. Subsequently he was appointed military member of the council of the Governor-General and aided in the amalgamation of the national army and that of the East India Company. He was given a divisional command in the expedition to China in 1860, in which the French took part. He participated in the assault upon the Peiho forts, dismantled them, entered Peking, and returned to India the same year. Lord Elgin's (q.v.) sudden death left him acting Governor-General for a short time. In 1868 he commanded the English expedition sent to Abyssinia, and his troops, after a difficult march of over 400 miles, stormed the royal stronghold of Magdala. On his arrival in Eng-

land Queen Victoria created him Baron of Magdala. The next year he was appointed commander in chief in India. Six years later he returned to Europe and in 1883 was raised to the rank of field marshal. Consult C. R. Markham, *History of the Abyssinian Expedition* (London, 1869), and H. Escott, *Pillars of the Empire* (ib., 1879).

NAPIER, Sir William Francis Patrick (1785–1860). A British general and historian, born at Celbridge, Kildare, Ireland. He was a brother of Sir Charles James Napier, the conqueror of Sind, and a cousin of Sir Charles Napier, the English admiral. Entering the army as ensign in the Royal Irish Artillery (1800), he became captain of a regiment in Sir John Moore's brigade (1804); took part in the siege of Copenhagen (1807); went with his regiment to Spain (1808); and for his bravery in the Peninsular campaigns was appointed lieutenant colonel (1813). Later he became colonel (1830), then Lieutenant Governor of Guernsey (1842), and general (1859). He was knighted in 1848. Napier passed his last years at Scinde House, Clapham. He gained an immense reputation by his *History of the Peninsular War* (6 vols., 1828–40). This work, which aimed to tell the truth, led to a long controversy with the officers who had taken part in the campaigns. It is, however, believed to be an impartial statement of facts. His *History of Sir Charles Napier's Administration of Scinde* (1851) is written in his boldest style. Consult the *Life* by Lord Aberdare (London, 1864).

NAPIER'S RODS, or Bones. See Calculating Machines.

NA'PLES (It. *Napoli;* anciently, *Neapolis*). The largest city and seaport of Italy, capital of the Province of Naples, formerly the capital of the Kingdom of the Two Sicilies, situated on the west coast of the peninsula, at the foot of encircling hills, on the north side of the Bay of Naples, in lat. 40° 52′ N. and long. 14° 15′ E. (Map: Italy, E 4). It is about 5 miles long and 3 miles broad. The climate is mild, although the variations in temperature and humidity, owing to alternating winds from the north and south, are often great and sudden. The thermometer ranges from 26° F. in January to 97° in July, the average winter temperature being 50°, the average summer temperature 75°. Fogs are rare and snow seldom falls. The rainy season lasts from the end of January to the beginning of April. The heat of summer is tempered by the sea wind that blows until about two o'clock in the afternoon. Vesuvius acts as a great natural barometer: when its smoke blows towards Capri, fair weather is always expected.

The far-famed situation of the city on the sea, amid its amphitheatre of hills, can be compared perhaps only with that of Constantinople. Across the bay to the south is visible the historic island of Capri; on the eastern shore are villas, vineyards, and orange groves grouped around tiny cities; while over all towers Vesuvius with ominous grandeur. The environs in general are unsurpassed for loveliness and the great variety of interest they present. Sorrento, Capri, Ischia, and the Phlegræan district are localities that delight the sightseer. Other striking attractions are the former monastery of the Camaldolites and the hill of Posilipo with its many associations and its fine streets offering magnificent views.

Architecturally Naples is by contrast surprisingly poor. The ancient and commercial part of the city lies east of a line drawn from Capodimonte through Sant' Elmo to Castello dell' Ovo, and is divided from north to south by the Via Roma.

The modern and western part, where are nearly all the principal hotels, is bordered on the south by the famous Riviera di Chiaia along the bay in a curved course of 3 miles. Here the Villa Nazionale stretches away—a splendid park dating from 1780 and extended in 1807, 1834, and subsequently. It is embellished with lordly allées, statues, and miniature temples. It contains the well-known aquarium of Naples, which exhibits a great variety of extraordinary fish, being, in fact, a school established for the scientific investigation of the aquatic fauna and flora of the Mediterranean. The public squares of Naples are adorned with fountains and obelisks, and within the precincts of the city are several highly prized springs of fresh mineral waters.

The handsome Renaissance Porta Capuana is justly celebrated. The castles are numerous. Among the principal ones are the Castello Nuovo (dating from 1283 and renovated in 1905), called the Bastille of Naples, somewhat similar to the Tower of London, and adorned with a fine triumphal arch erected (1470) in honor of Alfonso of Aragon; the Castello Sant' Elmo (1535), commanding a magnificent view from the ramparts; and the historic egg-shaped Castello dell' Ovo. The last (begun in 1154) is situated on an islet connected with the mainland and is one of the conspicuous features. Near it is the street Santa Lucia—the centre of the noisy Neapolitan life, particularly of the lower classes. Women engaged in domestic duties, naked children, and peddlers of all sorts present a unique spectacle here in a city characterized by festivals and processions and bustling traffic. The neighboring royal palace (begun in 1600) is an enormous edifice. It has an imposing façade decorated (1885) with rich statues. The interior is uninteresting.

Of the nearly 300 churches none is very striking. The cathedral, a Gothic edifice, built in 1272–1323 but repeatedly modernized, is dedicated to St. Januarius, and contains the celebrated vials in which the liquefaction of the saint's blood is alleged to take place on three annual festivals. The church also contains the tombs of Charles of Anjou and Pope Innocent IV, besides numerous fine paintings and statues. San Martino (fourteenth century) is an interesting Gothic church, with its belvedere, cloisters, and museum. In the monastery attached to the church of Santi Severino e Sosio are deposited the valuable archives of the former Neapolitan kingdom, consisting of some 40,000 manuscripts, the earliest dating from 703.

Naples is far richer in archæological than in architectural interest. The Museo Nazionale (built in 1586 as cavalry barracks, seat of the university from 1616 to 1780, and devoted to its present purpose since 1790) contains an immense and unsurpassed collection of frescoes, paintings, mosaics, sculptures, antiquities, coins, medals, and inscriptions, including objects excavated at Herculaneum and Pompeii. Among its rarest, most celebrated possessions are the Farnese Bull, the Farnese Hercules, the Mosaic of the Battle of Alexander, the Pompeiian fres-

NAPLES

VIEW OF THE CITY FROM THE TOMB OF VERGIL (UPPER)
PIAZZA DEL MUNICIPIO (LOWER)

coes, and a valuable collection of bronzes and vases. The splendid Galleria Umberto Primo was completed in 1890 at great expense.

At the head of the educational system is the university. (See NAPLES, UNIVERSITY OF.) There are also an engineering school, an Oriental institute, an astronomical observatory, a botanical garden, several unions for the study and diffusion of many branches of knowledge, a marine school, and a royal conservatory of music. The charitable institutions are numerous, on an extensive scale, and richly endowed. Besides that of the university there is the National Library, with 395,439 volumes, 221,859 pamphlets, and 7997 manuscripts in 1913. Naples has many good playhouses. The San Carlos is one of the largest and most famous of opera houses. The marionette theatres and the theatres where the famous Neapolitan Pulcinella is to be seen are a never-failing source of entertainment.

Naples is one of the most important manufacturing centres in Italy. Ships, locomotives and cars, and stationary engines are built, and glass, cotton, wool, gloves, perfumery, linen and silk products are manufactured. The extensive steel works are chiefly in the hands of English firms. Copies of ancient vases and bronzes, lava articles, and coral and tortoise-shell goods are largely dealt in. The commerce of Naples is more important than its industries. It has communication by steamers with nearly all parts of the world. The harbor has been improved in the last decade, and Naples has surpassed Genoa in the amount of tonnage entered and cleared. In 1911 there were entered 9468 vessels, of 8,260,294 tons, and cleared 9462, of 8,273,378 tons; total movement, 16,533,672, as compared with 10,145,000 in 1904 and 6,293,000 in 1898. The chief articles of import are coal, iron, and steel (Great Britain, Germany, and Belgium), grain (Russia and India), lumber (Austria-Hungary), cotton (United States and India), wool, leather, oils, and wines (France), and chemicals (Germany and Great Britain). The leading exports are wine and brandy, dried and subtropical fruits, nuts, paper, and hemp. The number of emigrants leaving the port of Naples in 1907 was 220,109; in 1908, 51,191; in 1909, 184,433; in 1910, 161,868; in 1911, 115,006; in 1912, 144,033.

Naples has been called the most densely populated city of Europe; in modern times its inhabitants have increased at a remarkable rate. Half of the population, including the countless lazzaroni and trovatori, were huddled together in the slums in ancient unsanitary buildings that crowded narrow, crooked streets, until the cholera epidemic of 1884 aroused the whole country. In 1885 the Italian Parliament voted about $20,000,000 towards a systematic renovation which, when entirely completed, was to cost city and nation a far greater sum. A new water supply was introduced from the mountains near Avellino, 50 miles away, and plans were elaborated for a new sewer system, for new streets, new squares, and new buildings. Of 271 old streets 144 were to be abolished and 127 widened; the habitations of 90,000 people were to be destroyed, and the density of the population reduced from 645 to 280 per acre. Prior to the destruction of the slum dwellings a large working-class quarter was erected in the northern part of the city. Gradually the miserable conditions formerly obtaining have vanished. The widening of streets has permitted the introduction of numerous electric tramways. In 1901 the population of the city was 490,183; the commune had 563,540 inhabitants in that year, and, in 1910, 678,031. Est. population, 1915, 697,917.

For the history of Naples see TWO SICILIES, KINGDOM OF THE.

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NAPLES, BAY OF. A bay of the Mediterranean Sea on the southwest coast of Italy (Map: Italy, E 4). It is 20 miles wide from Cape Miseno on the northwest to Point Campanella on the southeast and extends inward about 10 miles. The bay is famous for its beautiful scenery, the view including the city of Naples, Castellamare, and the other towns and villages along the shores, dominated by Mount Vesuvius on the east, while at the entrance to the bay are the lovely islands of Ischia and Capri. The bay offers good anchorage in 7 fathoms of water and is well sheltered except from winds in the southern quarter.

NAPLES, KINGDOM OF. See TWO SICILIES, KINGDOM OF THE.

NAPLES, UNIVERSITY OF. An Italian university, founded in 1224 by the Emperor Frederick II. It was reformed or reconstructed at least three times before 1266, when Charles I of Anjou finally placed it on a sound footing. Among its earliest and most brilliant scholars was Thomas Aquinas, who lectured here during its short but brilliant revival about 1272–74. It was reorganized in 1780, and since the incorporation of Naples with Italy, 1860, it has increased remarkably in numbers and influence. Its faculties are law, medicine, and surgery; physical sciences, philosophy, and letters; and the school of pharmacy. It had in 1913 a budget of nearly 930,000 lire and more than 6600 students, chiefly in law and medicine. Its library contains 353,620 volumes, 58,671 pamphlets, and a large number of incunabula and specimens of Aldines and other famous early books.

NAPO, nä'pō. A tributary of the upper Amazon. It rises on the slope of Mount Cotopaxi in Ecuador and flows southeast, emptying into the Amazon about 50 miles below Iquitos, after a course of 750 miles. For much of its course it forms the provisional boundary of Ecuador on the northeast. In its upper course it flows in a steep incline through a rough and rocky valley, but after emerging from the mountains it

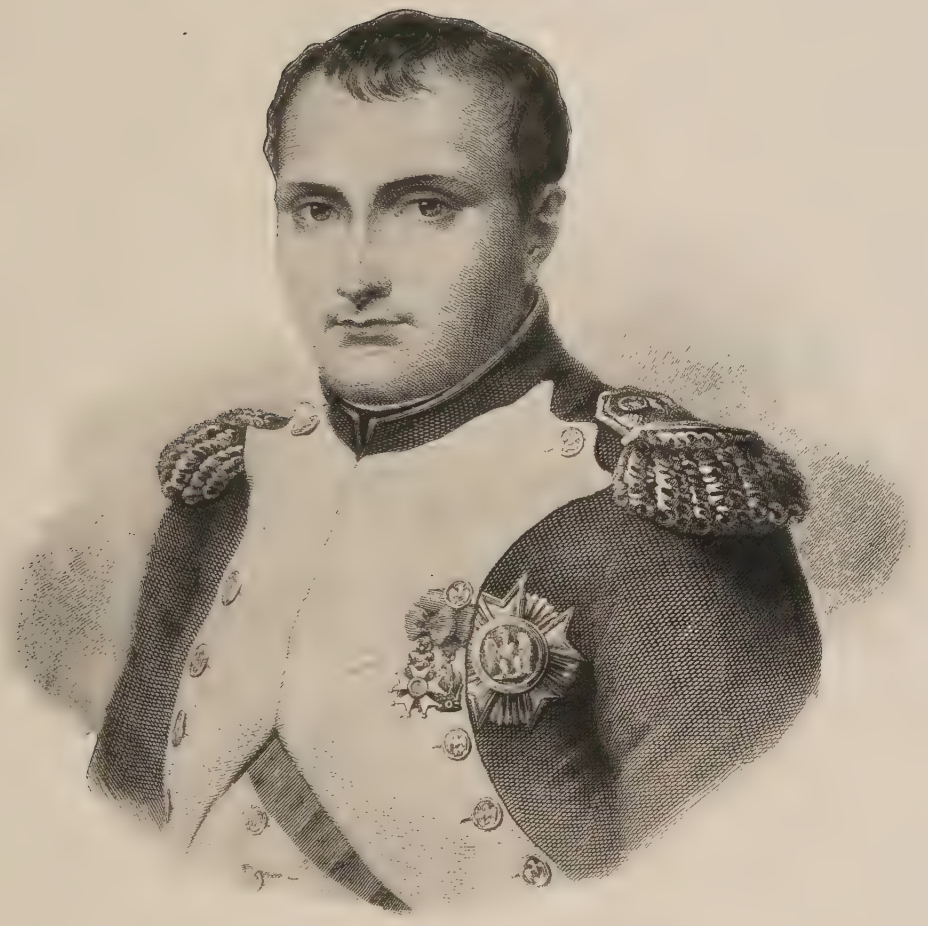
traverses a vast forest-covered plain, almost unexplored, and sparsely inhabited by savages. The Napo is navigable for steamers for nearly 400 miles, but the natural wealth of the region, including gold, sarsaparilla, and rubber, is but little exploited.

NAPO'LEON. A village and the county seat of Henry Co., Ohio, 36 miles southwest of Toledo, on the Maumee River, the Miami and Erie Canal, and the Wabash and the Detroit, Toledo, and Ironton railroads (Map: Ohio, B 3). Its manufactures are important, consisting of windmills, tanks, threshing machinery, separators, flour, etc. Napoleon contains a Carnegie library. The water works and electric-light plant are owned by the municipality. Pop., 1900, 3639; 1910, 4007.

NAPOLEON I, *Fr. pron.* nà'pō'lā'ôN' (NAPOLEON BONAPARTE) (1769–1821). Emperor of the French, born at Ajaccio, on the island of Corsica, Aug. 15, 1769. The family of Buonaparte (as the name was spelled until 1796) was of Tuscan origin, but had been settled in Corsica since 1529. The parents of the future Emperor were Carlo Maria de Buonaparte and Letizia Ramolino, a descendant of a good Florentine family. Napoleon was the fourth child and the second son. After a few months spent in learning French in a school at Autun, he entered the military school at Brienne on April 23, 1779, and there remained until he was transferred to the great military school in Paris in September, 1784. Just a year later he received his commission as second lieutenant in La Fère Regiment of Artillery, which was stationed at Valence. He served with this regiment until 1791, but passed the greater part of his time (1786–88 and 1789–91) on furlough in Corsica, where he took part in the patriotic movement under Paoli. He was in Paris during the events of Aug. 10, 1792, when the mob of Paris attacked the Tuileries, and on August 30 attained the rank of captain in the army. He returned to Corsica, but this time he had a falling out with Paoli and identified himself with the French Revolutionary party on the island. The defeat of this party compelled Napoleon and the other members of his family to escape and take refuge in France in June, 1793. As yet Napoleon had shown little indication of his genius and of the mighty career he was destined to lead. He had mastered his profession of arms, had shown a capacity for intrigue, and had learned to rely upon himself. In his long leisure hours he had devoted himself faithfully to books of a solid character. He was in the beginning an enthusiastic admirer of Rousseau, and his earliest writings, which date from the Valence period, reveal a depth of sentiment difficult to reconcile with his later career. Buonaparte rejoined his regiment in southern France, participated in the occupation of Marseilles by the Revolutionary forces, and then marched to Toulon to take part in the siege of that town. As *chef de bataillon* in the Second Regiment of Artillery he was practically in charge of the artillery during the siege operations, and won for himself golden opinions from the commissioners of the Convention with the army. One of these commissioners was Robespierre's younger brother, Augustin, whose intimate friend and confidant Buonaparte now became. His conduct at Toulon won him promotion to the rank of general of brigade, but his relations with the younger Robespierre and his outspoken Jacobinism caused his imprisonment after the coup of the 9th Thermidor. An old Corsican acquaintance, Saliceti, was one of the commissioners of the Convention in the south of France at this moment and intervened on behalf of the young artillery officer. Marmont, who was in position to help Buonaparte at this time, said that he did so because he saw "there was so much future in his mind." He was released on Aug. 20, 1794, and after further misfortunes he turned up in Paris, where he found temporary employment in the topographical bureau.

The Convention was now drawing to a close, but was forced to face one more insurrection, one antagonistic to the new constitution of the Year III. (See FRENCH REVOLUTION.) The work of defending the Convention was intrusted to Barras (q.v.), who selected as his second in command Buonaparte, whom he had seen at Toulon, and whom he now found in Paris half fed and shabbily clothed, awaiting the next turn of the wheel of fortune. "From the first," says Thiébault, "his activity was astonishing; he seemed to be everywhere at once: he surprised people by his laconic, clear, and prompt orders: everybody was struck by the vigor of his arrangements, and passed from admiration to confidence, and from confidence to enthusiasm." With the "whiff of grape shot" he swept the Parisian mob from the streets on the 13th Vendémiaire (Oct. 5, 1795). The Convention came to an end, the Directory took its place with Barras as one of the Directors, and Buonaparte succeeded Barras as commander of the Army of the Interior. Barras welcomed the young hero of the hour to his salon, where the grace of person and charm of manner of a young Creole widow, Josephine de Beauharnais, aroused in Buonaparte passionate admiration and love. Despite a disparity of six years in their ages, the influence of Barras brought about a marriage on March 9, 1796. Meanwhile the favor of another Director had brought to Buonaparte a much more important command in the army. Buonaparte had visited the Genoese Riviera in 1794, and at the Topographical Bureau he had taken the opportunity to prepare a plan of campaign in northern Italy, which he now perfected and presented to Carnot (q.v.), who admired it and ordered its execution. Schérer, the general of the Army of Italy, replied that if the Directors wanted the plan carried out they should send down the man who devised it to do it. He was taken at his word; Buonaparte was appointed to the command, and left Paris two days after his marriage, arriving at Nice in March, 1796.

At this moment, after the treaties of Basel, France was still at war with England, Austria, and Sardinia. England was no longer a factor in the military situation on the Continent; Austria had been attacked only in southern Germany, while on the Italian frontier France had done nothing except to make intermittent attacks on Sardinian territory. Italy was made up of patches of Austrian territory and of petty states under Austrian influence, which offered a rich spoil for the conqueror. The main body of the Austro-Sardinian army was at Montenotte, occupying the pass between the Maritime Alps and the Apennines at the headwaters of the Bormida and the Tanaro, two affluents of the Po. One road followed the latter northwest to Turin, the other road followed the Bormida to the northeast to Milan; between the two was an almost im-



NAPOLEON I.

FROM AN ENGRAVING OF A PORTRAIT BY DAVID

passable mountain country. A successful blow would compel the Sardinians to retreat on their capital, Turin, and the Austrians on Milan, their headquarters in Italy, without hope of reuniting their forces. This army of 52,000 men was somewhat scattered and could not be used in full force at any one point, and many of the men were sick. The French Army of Italy was no better off. There were 42,000 poorly equipped, worse clad, and unpaid men scattered in detachments along the Riviera from Nice to Savona. Their new commander, Buonaparte, was a slender, delicate-looking youth of 26, who was known only for some skill shown in handling artillery at Toulon and in Paris. Rumor said he owed his appointment to a discreditable intrigue between Josephine and Barras. Certainly there was little to promise one of the greatest military campaigns in all history, the most dazzling success of modern times. Bonaparte (as he now spelled his name) from the moment of his arrival took hold of things with the grasp of an experienced general skilled in the management of men. His address to his army kindled their imagination: "Soldiers, you are half-starved and half-naked; the government owes you much, but can do nothing for you. I am about to lead you into the most fertile valleys of the world; there you will find flourishing cities and teeming provinces; there you will reap honor, glory, and riches. Soldiers of the Army of Italy, will you lack courage?" Reenforcements arrived which raised the army to about 50,000 men, whom Bonaparte concentrated at Savona. The campaign opened at Montenotte on April 11. Three successive attacks compelled the Sardinians under Colli to retreat towards Turin, while the Austrian commander, Beaulieu, fell back towards Milan. Bonaparte pressed on against Colli, and, though he had no power to negotiate, compelled him to sign the armistice of Cherasco (April 28), which gave France military control of Piedmont and left Bonaparte free to attack Beaulieu. From this moment Bonaparte showed the Directory that they had no ordinary general to deal with. He did not wait for orders. He did things and then reported; he preferred no requests, but presented demands coupled with an ultimatum. Immediately after the signature of the armistice with Colli, Bonaparte reassembled his forces, which had scattered to forage and plunder, and prepared to attack Beaulieu, who had retreated across the Po and the Ticino. Beaulieu expected Bonaparte's attack near Pavia. The French commander turned his flank, seized Piacenza on May 7, and compelled Beaulieu to retreat across the Adda, leaving Milan to the French. Bonaparte pursued the retreating Austrians and defeated them at the bridge of Lodi, across the Adda, on May 10. After this battle it is said the troops gave Bonaparte the endearing name of the Little Corporal. Bonaparte promptly occupied Milan and there displayed his characteristic qualities. He appealed to the popular enthusiasm, and led the Milanese to believe that he was their deliverer. He established a temporary administration, welcomed artists and writers, and showed an interest in the University of Pavia. On the other hand, he extorted a war contribution of 20,000,000 francs and seized and sent to Paris numerous literary and art treasures. The young general did not dally. In a few days he was again pushing on against the Austrians, and on June 3 the siege of Mantua was begun. This strongly fortified town was the key to northern Italy. While the siege was in progress Bonaparte paid his respects to the dukes of Modena and Parma, to the Grand Duke of Tuscany, and to the Pope, each of whom he compelled to buy peace with large sums of money and with treasures of art and literature. The Austrians raised army after army for the relief of Mantua, but in vain. The first, under Wurmser, advanced from Tirol in three divisions, and compelled the raising of the siege of Mantua by Bonaparte, who marched to meet the Austrians and defeated them at Castiglione on August 5. Wurmser made a second attempt by the valley of the Brenta, but was defeated at Bassano on September 8, and driven into Mantua, the siege of which was resumed by the French. Alvinczy, by the way of the Brenta, and Davidovich, by the way of the Adige, brought the second Austrian army into Italy, planning to concentrate 60,000 men at Verona. Bonaparte had to meet them with about 40,000, and at Caldiera, on November 12, he met a severe check; but, driven to desperation, he put forth superhuman efforts, and after three days of fighting defeated the Austrians at the bridge of Arcole (q.v.) and forced them to retreat. Alvinczy, from the wreck of his army and with reënforcements, created the third Austrian army and advanced southward between Lake Garda and the Adige. Bonaparte hastened to meet him, seized the important strategic position at Rivoli, repulsed Alvinczy on Jan. 14, 1797, and hurled him back into Tirol. Turning back on Mantua, Bonaparte captured at La Favorita two days later an important detachment of Alvinczy's force which by a flank movement had almost succeeded in reaching Mantua. Wurmser surrendered Mantua on February 2. In this famous campaign of 1796 Bonaparte relied on three important maxims to which he held fast throughout his career: divide for foraging, concentrate for fighting; unity of command is essential for success; and time is everything. Quickness to divine his enemy's plans, a thorough knowledge of geography which produced combinations that were executed with bewildering audacity, an ability to get a maximum amount of marching and fighting out of an army of young veterans who were poorly shod and clad and ill fed, and the loyal support of his subordinates, Augereau, Masséna, Joubert, Lannes, Marmont, Victor, Murat, and Junot, combined to enable Bonaparte to conquer northern Italy for France. The campaign of 1797 was an act of colossal audacity. With less than 50,000 men Bonaparte drove the Archduke Charles and the Austrians from Italy, forced the passes of the Alps in March, and pressed on directly for Vienna without waiting for Moreau (q.v.) to coöperate. At Leoben, within 100 miles of Vienna, he signed preliminaries of peace with Austria on April 18.

Bonaparte the conqueror began to take wider views of the part he was to play, and played it with a boldness and a skill that dazzled France into complacency. He organized the Italian conquests into the Cisalpine Republic and constituted the Genoese dominions into the Ligurian Republic; he sent Augereau as his secret agent to conduct the military operations of the coup d'état of the 18th Fructidor (see FRENCH REVOLUTION); he lived and acted like a monarch in northern Italy; and finally, disregarding the express orders of the Directors, he negotiated with

Austria the Treaty of Campo Formio (Oct. 17, 1797). Austria gave up her former Belgian possessions and Lombardy, and received most of the territories of the extinguished Republic of Venice. Bonaparte now returned to France, but the Directors were afraid of him and sought to rid themselves of him by dispatching him on some out-of-the-way or hazardous enterprise. It was evident to him that a direct attack upon France's one remaining foe, England, could not succeed, and he suggested instead the campaign in Egypt. The Oriental dream was always before his eyes, and throughout life influenced his policy. He saw in India the source of England's power, and he determined to attack India. He negotiated with Tipu Sultan, a determined foe of the English, and, as the easiest route to India was by the Red Sea, he proposed to conquer Egypt as a stepping-stone to India. An expedition was fitted out with the utmost secrecy at Toulon, and on May 19, 1798, he set sail with a large fleet carrying 35,000 men. He stopped on the way to capture Malta. On July 1 he landed in Egypt and occupied Alexandria on the next day. Advancing into the desert, he encountered and defeated the famous Mameluke cavalry in the battle of the Pyramids on July 21, and three days later entered Cairo. Desaix was detached to conquer Upper Egypt, and Bonaparte devoted himself to consolidate his conquests. On August 1–2, however, Nelson destroyed his fleet in Abukir Bay, and Turkey declared war and planned to recover Egypt. Taking the offensive at the beginning of 1799, Bonaparte invaded Syria, captured Jaffa, and laid siege to Acre. Junot fought an engagement with the Turks near Nazareth, and Kléber found himself attacked by 30,000 of them at the foot of Mount Tabor on April 15, but was rescued by the opportune arrival of Bonaparte. Returning to Acre, Bonaparte found that he was unable to take the place by storm, and having lost 5000 men in fighting or from the plague, he ordered a retreat. Arriving in Egypt, he met another Turkish force, which had landed near Alexandria, and defeated it on July 25. News from France told of the infidelity of Josephine and of the evil plight of France under the decadent Directory, which was being attacked by the newly formed Second Coalition of the Powers of Europe against France. On the night of August 22–23, leaving Kléber in command, Bonaparte escaped from Alexandria and, evading the English ships, landed at Fréjus on Oct. 9, 1799.

On reaching Paris he speedily took counsel with the members of his family and after a scene with Josephine forgave her, though he did not forget her offense. Councils with Talleyrand, Sieyès, and other important men of affairs followed, but most of all with his brother Lucien, who was now President of the Council of Five Hundred. Plans were speedily devised, and on Nov. 9, 1799, the famous coup d'état of the 18th Brumaire took place. The Directory was overthrown, the Council of Five Hundred dispersed by soldiers, and a provisional government composed of Bonaparte and two of the late Directors, Sieyès and Roger Ducos, installed. Sieyès (q.v.) expected to be the managing head of the new combination, but at the first meeting found that Bonaparte had everything in his own hands. In a few weeks the provisional government drew up and promulgated the constitution of the Year VIII, which provided for four assemblies—one to propose laws, one to consider them, one to vote upon them, and one to decide upon their constitutionality—but in spite of this elaborate machinery left practically all the power in the hands of Bonaparte, who became First Consul (Dec. 24, 1799). Bonaparte devoted his attention to centralizing the government. Local initiative was carefully limited so that everything might be controlled from Paris. Prefects were installed in all the departments and subprefects in the minor divisions. This centralized bureaucracy, modeled after the traditions of the French monarchy, has survived to the present day. The new constitution when completed was ostensibly submitted to the people for their approval by means of a plébiscite, which resulted in favor of the constitution by a vote of 3,000,000 to 1562. Having arranged the more important details of the administration and restored internal peace by the pacification of the Vendée, he turned his attention to the military situation. The victory of Masséna at Zurich on Sept. 25–26, 1799, had freed France from the danger of invasion by the Second Coalition, but Italy and southern Germany were once more in the hands of the Austrians, and Masséna with a French army was shut up in Genoa. Bonaparte suddenly and with the utmost secrecy gathered a new army for the invasion of Italy. Instead of taking the expected course of advancing along the Riviera as in 1796 and raising the siege of Genoa, he took his army, whose existence was unknown to the Austrians, across the Great St. Bernard Pass and occupied Milan on June 2, 1800. The surprised Austrian General Melas endeavored to gather his forces and save himself. A detachment under Lannes defeated an Austrian detachment at Montebello on June 9, but on the 14th Bonaparte found himself forced to face the main Austrian army of 31,000 men at Marengo with only 18,000, and with difficulty saved himself from complete defeat. The opportune arrival of Desaix after the battle was really over led to a renewal of the fight, to the astonishment of the Austrians, who were driven from the field. The campaign of Marengo was a masterpiece, but the honors of the victory itself belong to Desaix, who bought it with his life, and to Lannes, Bessières, and the younger Kellermann. Melas evacuated all of Italy west of Mantua, but Austria was not ready to make peace until she had been defeated by Moreau at Hohenlinden (q.v.) on December 3 and Macdonald had crossed the Splügen and threatened Vienna. Negotiations were then opened between Cobenzl and Joseph Bonaparte, and on Feb. 9, 1801, the Treaty of Lunéville was signed. England was now the only remaining foe of France. England forced the French to evacuate Egypt and captured Malta; while Bonaparte forced Naples and Portugal to abandon the English alliance. The faint-hearted Addington ministry in England signed preliminaries of peace with France on Oct. 1, 1801, and on March 27, 1802, Cornwallis and Joseph Bonaparte signed the Treaty of Amiens, which gave France complete peace for the first time in 10 years. The diplomatic genius of Bonaparte shines brightly in these treaties, which enabled him to make real gains for France such as all the wars of Louis XIV had failed to obtain. He carefully hid many things in these treaties for future use, which enabled him to appear as the pacificator and reorganizer not only of France, but of

Europe, and as the founder of a great colonial empire. Seeds for future war were as carefully sown, which were to bring forth fruit at the appropriate season.

Bonaparte had shown himself the greatest master of the art of war and one of the shrewdest of diplomats, when at 30 years of age he undertook the duties of a ruler, lawgiver, and administrator. His greatness lay in the universality of his genius and in his inordinate capacity for hard work. Further, he was able to command the services of many men of extraordinary ability and to make their work his own. His reorganization of the government of France was accomplished in a few months and comprised enough achievements of the first order to have established the enduring fame of several statesmen. This tremendous activity so stirred and inspired his officials that they said "the gigantic entered into our very habits of thought." With Gaudin he reorganized the treasury department, regulated the assessment and collection of the taxes, and organized the Bank of France. With Chaptal he reorganized the local administration with the prefects and subprefects responsible to the central authority, the Council of State. The schism between the Catholic church and the constitutional clergy was healed and the Catholic church restored to its old-time place in France, by the negotiation of the Concordat (q.v.) with Pius VII in 1801. The Lutherans, the Calvinists, and ultimately even the Jews were brought into similarly close relations with the state. The educational system was reconstructed, especially in the matter of secondary schools and of technical education. The work was completed by the establishment in 1808 of the University of France, which comprised the whole teaching force of the Empire. The establishment of the Legion of Honor in May, 1802, provided a means of recognizing services to the state. The greatest triumph was the codification of the laws of France. See CODE NAPOLÉON.

France had lost her colonial empire in the eighteenth century, and it was the fond hope of Bonaparte that he might restore it and thus rival England in commerce and upon the seas. To this end he began a series of enterprises which embraced every quarter of the globe—North and South America, Africa, India and the East, and Australia. He secured the cession of Louisiana from Spain, and sent an army to recover Haiti, where the blacks had successfully risen against their oppressors. In all these schemes he was checkmated by England, but on the continent of Europe he was hindered by nothing more serious than protests in reaping the fruit of the wars of the French Revolution. He reconstituted upon the new French lines the Batavian Republic, the Cisalpine Republic (which became the Italian Republic), and the Ligurian Republic (1801–02). He extended the bounds of France, which already had the Rhine, the Pyrenees, and the Alps as her frontiers, by the annexation of Piedmont and Parma in 1802. He was actively concerned in the reorganization of Switzerland and of Germany in 1803. The Treaty of Aranjuez (March 21, 1801) bound Spain to France, while Portugal, the faithful ally of England, was humbled by the Treaty of Badajoz (Sept. 29, 1801).

Bonaparte's colonial schemes were frustrated by yellow fever, which destroyed General Leclerc and his army in Haiti and forced the Consul to sacrifice Louisiana to the United States (1803) and abandon his dream of empire beyond the seas. Pique at this disappointment hastened Bonaparte into the predetermined rupture with England. A *casus belli* was found in the question of Malta, which England refused to surrender in accordance with the terms of the Treaty of Amiens. Mortier occupied Hanover, of which George III was King. Gen. Gouvion Saint-Cyr was ordered to occupy the Kingdom of Naples, an ally of England, to offset the occupation of Malta. The French army was mobilized in six divisions and stationed along the Channel from Ostend to Brest. War existed from May 16, 1803, but actual hostilities did not begin until over two years later. In the meantime England recalled Pitt to office (May, 1804). Pitt's great service consisted in securing allies and in forming the Third Coalition against France. In this work he was aided by Bonaparte's blunders, the most notable of which was the execution of the Duc d'Enghien (March 21, 1804), in retaliation for the Royalist plots of Pichegru and Georges Cadoudal. On the day of Pitt's return to power Bonaparte was offered the title of Emperor by the French Senate, and on Dec. 2, 1804, he was crowned Emperor as Napoleon I at Paris in the presence of Pope Pius VII. On May 26, 1805, he was crowned at Milan King of Italy. A few days later followed the last of his series of aggressions, which provoked Austria and Russia into the alliance with England, the annexation to France of the Ligurian Republic (June 4). A month later Russia and England signed their alliance against Napoleon, and on August 9 they were secretly joined by Austria. Sweden, Portugal, and Naples were practically, though not formally, parties to this coalition.

For two years Napoleon had been dallying with a scheme for the invasion of England. In the camps along the Channel he had organized, equipped, and drilled his famous Grand Army, composed largely of veterans of the wars of the Revolution, and at Boulogne special preparations had long been under way for an attack upon England. The summer of 1805 seemed the propitious time for the attack, and Napoleon made elaborate dispositions for obtaining naval control of the Channel and for the transportation of an army of 160,000 men from Boulogne to the Kentish coast. The French fleet under Villeneuve, however, was outmanœuvred and outfought by the English under Cornwallis, Calder, and Nelson. By the middle of August, 1805, the scheme had become impossible of execution. Napoleon, however, had foreseen this possibility; his other acts had already provided him with another chance to employ his army, and he had worked out in his mind the plan of his most brilliantly successful campaign, that of Austerlitz. On August 29 the Army of England was officially denominated the Grand Army and divided into seven corps under Bernadotte, Marmont, Davout, Soult, Lannes, Ney, and Augereau, with the cavalry under Murat and the Imperial Guard under Bessières, in all about 220,000 men under the personal command of the Emperor, with Berthier as chief of staff. War was declared against Austria on September 25, and the next day the movement of the Grand Army into southern Germany began. On the part of Austria the Archduke Charles, with over 90,000 men, the best general and the largest army, was intrusted with operations in Italy, where 50,000 French troops were under

the command of Masséna, while the smaller Austrian army, under the command of the Archduke Ferdinand and General Mack, invaded Bavaria and occupied the untenable line of the Danube and the Iller with headquarters at Ulm. This move left Austria almost bare of troops. Making a feint at repeating Moreau's tactics of 1796 in attempting to turn Mack's left, Napoleon ordered the actual attack to be made on the right. Bernadotte and Marmont occupied Munich, Davout and Soult seized Augsburg, while Ney and Lannes occupied Günzburg and operated to the north of Ulm. Mack made three fruitless attempts to extricate himself, but after defeats at Wertingen, Memmingen, and Elchingen (October 14), he was forced to capitulate with 33,000 men on October 20. Though the Archduke Ferdinand escaped, Napoleon's forces were thus able to advance directly to Vienna, which he occupied on November 13. The Russian forces which had been advancing to support Mack were forced to fall back into Bohemia, where the various divisions were united under the command of Kutusoff and joined by part of the Austrian forces. Napoleon marched northward to meet them, and on December 2 won his greatest victory, Austerlitz. The campaign of Ulm and Austerlitz was won by Napoleon's knowledge of the value of time, the whirlwind rapidity of his movements, and the precision of his combinations. The battle of Austerlitz was won by a masterly use of artillery. The vanquished Emperor Francis I of Austria humbled himself before Napoleon in the Treaty of Pressburg (December 26) and consented to large cessions of territory, including the former Venetian dominions, Tirol (given to Bavaria), etc. The overthrow of Austria resulted in the formal dissolution of the old Holy Roman Empire (Aug. 6, 1806).

What Austerlitz was for Napoleon on land, Trafalgar was for England on the sea. After a brief rest at home, Nelson had been ordered out to attack Villeneuve, who with the combined French and Spanish fleets sailed out of Cadiz and met Nelson off Cape Trafalgar. England's greatest sea fighter won the greatest naval battle of the century, but lost his life (Oct. 21, 1805). After this the French were able to do nothing at sea, and the ports of both France and her allies were generally blockaded by the English fleets. England was undisputed mistress of the seas, while Napoleon began to remake the map of Europe as though he were the undisputed master of the Continent. The most important changes during the year 1806 were the formation under his protection of the Confederation of the Rhine, the establishment of his brother Joseph as King of Naples and of his brother Louis as King of Holland, and the creation of the Grand Duchy of Berg for his brother-in-law Murat. The death of Pitt (Jan. 23, 1806) led to negotiations between Napoleon and Fox, the new Foreign Secretary. These negotiations, as well as those with Russia, came to naught, and to Napoleon's surprise this failure was coupled with the decision on the part of Frederick William III of Prussia to make war upon him. Single-handed Prussia undertook to meet Napoleon, who, as soon as he foresaw that war was inevitable, acted with the same vigor as in the previous year. The Prussian army under Prince Hohenlohe-Ingelfingen and Charles William Ferdinand, Duke of Brunswick, was drawn out in a line 85 miles in length, extending from Gera westward to the borders of Hesse-Cassel, with the bulk at Erfurt. Napoleon left Paris on September 25 and assumed charge of the campaign at Würzburg on October 2. On the 10th Prince Louis Ferdinand was defeated and slain in a skirmish at Saalfeld; on the 14th Napoleon surprised the Prussian army in its attempt to concentrate, and in person defeated Hohenlohe at Jena, while Davout defeated Brunswick at Auerstädt. Murat and Lannes pursued Hohenlohe and forced him to surrender at Prenzlau (October 28), while the other remnants of the Prussian army and the fortresses surrendered without a blow. Saxony, which had acted as the ally of Prussia, went over to Napoleon, and later received as reward the Duchy of Warsaw. From the Prussian capital Napoleon issued the Berlin Decree, which, with the Milan Decree of 1807 and other decrees, was directed against English commerce. See CONTINENTAL SYSTEM.

Prussia, though vanquished, continued weakly the struggle in her eastern provinces, where Bennigsen and the Russians were ready to join in the contest. Murat occupied Warsaw, then Prussian territory, in November, 1806. In December Napoleon entered the ancient Polish capital and was greeted as the restorer of Polish liberties. The French having gone into winter quarters, Bennigsen hoped to surprise them and destroy them before they could again take the field, and accordingly attacked Ney and Bernadotte, but their successful resistance defeated the plan and Napoleon in person pursued Bennigsen, who retreated toward Königsberg, and overtook him at Eylau (q.v.). The ensuing battle (Feb. 7–8, 1807) was a butchery, not a victory. Napoleon hurried up reënforcements to renew the struggle in the spring. Sebastiani, the French Ambassador at Constantinople, persuaded the Sultan to declare war against Russia. Gardane was sent to stir up Persia to like action. Mortier induced the Swedes to treat with France. The campaign for Königsberg began early in June and was marked by the indecisive action of Heilsberg (June 10) and the defeat, four days later, of the Russians under Bennigsen at Friedland (q.v.). On June 25 the Czar and Napoleon held their famous conference of Tilsit (q.v.) on a raft moored in the Niemen. By the Treaty of Tilsit Prussia was humbled even more than Austria had been at Pressburg, while the Czar became the ally of Napoleon and began to plan with him the division of the world between them.

Though England, under the Ministry of All the Talents, had behaved very badly towards Prussia and Russia, she remained the one steadfast foe of the French Emperor, and pursued without wavering her policy of opposition to Napoleon. At Tilsit Napoleon bound the Czar to enforce the Continental System against England, and then began the task of compelling all the lesser Powers to adhere to the system. There were to be no neutrals. Portugal, the constant ally of England, was the first victim. By the Treaty of Fontainebleau Napoleon joined with Spain to dismember that Kingdom, and in November, 1807, a French army under Junot occupied the country with little trouble, the royal family having already started for the New World to establish a temporary capital at Rio de Janeiro. The year 1808 witnessed the unfolding of Napoleon's designs against Spain. Gradually, in spite of all treaties, French

troops were sent across the Pyrenees, where they quietly took possession of various fortresses. Spain was suffering from the family troubles of the Bourbon monarch, and it suited Napoleon's purpose to make use of them and to order the advance of a French army under Murat towards Madrid. This movement precipitated the fall of the Bourbons. Charles IV was compelled by a popular uprising to abdicate in favor of his son, Ferdinand VII (March), and a little later father and son, at a meeting with Napoleon at Bayonne, were forced to renounce the Spanish throne. On June 6, 1808, Joseph Bonaparte was proclaimed King of Spain. For an account of the struggle in Spain and Portugal, see PENINSULAR WAR.

In Austria Francis I had called to office as his chief minister Count Philip Stadion, who, with the aid of Archduke Charles, devoted himself to the task of preparing Austria for another struggle with Napoleon. The misfortunes of Napoleon in Spain and the urgency of England, which offered liberal subsidies and active coöperation, determined the Austrians to try their fortunes once more in the spring of 1809. In April Archduke Charles opened the war by invading Bavaria, while another force under Archduke John invaded Italy. Napoleon reached the scene promptly and in the five days' fighting (April 19–23) around Ratisbon completely defeated the Austrian plan of campaign and forced Archduke Charles to retreat towards Vienna, which the victorious Emperor entered on May 13. He then crossed the Danube and attacked the Archduke, who had taken up strong positions in the villages of Aspern and Essling. Two days of hard fighting (May 21–22) failed to give Napoleon any decided advantage, and he found himself and his army practically prisoners on the island of Lobau in the Danube. With his accustomed vigor he ordered up reënforcements and reorganized the troops under him. On July 5 Napoleon left the island of Lobau and on the 6th defeated the Archduke Charles in a great battle at Wagram. On October 14 was signed the Treaty of Schönbrunn (q.v.), by which Austria was forced to make large cessions of territory to the overbearing conqueror. From 1809 to 1812 the main strength of the French Empire was devoted to continuing the struggle in the Peninsula. A number of isolated events in other parts of Europe, however, made the period important. In pursuance of the Treaty of Tilsit, the Czar robbed Sweden of Finland (1808), and in the same year the French seized Swedish Pomerania. The next year the Swedish Kingdom was the scene of a revolution. Gustavus IV was deposed and his uncle placed on the throne as Charles XIII. Marshal Bernadotte, the brother-in-law of Joseph Bonaparte, was elected heir to the childless monarchy and intrusted with the government of the Kingdom. (See CHARLES XIV.) Denmark had likewise been marked to suffer on behalf of Napoleon's Continental System; but in this instance he was forestalled by England, which seized the Danish fleet in September, 1807. After the Treaty of Tilsit a kingdom of Westphalia was carved out for Jerome Bonaparte in Germany, and numerous changes made in the Confederation of the Rhine. Napoleon enlarged his own Empire by the annexation of Tuscany (1807), the Papal States (1809), Holland (1810), Valais and the German coast line to Lübeck (1810). He also kept the Illyrian provinces, which had been wrested from Austria, for himself. Naples was transferred to Murat after the choice of Joseph as King of Spain. Pope Pius VII, the same pontiff who had consecrated Napoleon as Emperor in 1804, was carried away as a prisoner and kept in confinement. The new Cæsar must have an heir to his Empire, and accordingly Josephine was divorced and a marriage arranged in 1810 with the Archduchess Maria Louisa of Austria, daughter of the Emperor Francis, who bore Napoleon one son, the King of Rome (1811). From Napoleon's policy England profited as much as did France, for the whole commerce of the seas was under her control and she had seized the colonies of France and all those of the countries under French control or influence that she saw fit. During the years from 1809 to 1815 England furnished the inspiration and the sinews of war for every campaign against Napoleon, but it was only in the Peninsula that she was directly responsible for the conduct of the campaign, which was carried on with desperation on both sides till the French were driven beyond the Pyrenees in 1814.

For three years after Wagram Napoleon did not in person conduct a single military operation. Family affairs and the administration of his great Empire occupied all his attention. During these years many changes were taking place which presaged the downfall of the great conqueror. Austria was very cautiously strengthening her position under the skillful direction of Metternich. The regeneration of Prussia under Stein, Scharnhorst, and Hardenberg is one of the most notable events of the nineteenth century. Russia was never content with the French alliance, the enforcement of the Continental System was causing great suffering and discontent, and the Czar Alexander was beginning to lose his enthusiastic admiration for Napoleon, who had offended him by concluding a matrimonial alliance with Austria without waiting for an answer to his request for the hand of a grand duchess in marriage and, most of all, by the annexation of Oldenburg to France. The estrangement was increased by the Cæsarism of Napoleon, who could no longer endure the existence of even a friendly rival. Alexander, duly warned of Napoleon's intentions, turned to England and in 1812 entered into a close alliance with her. With Turkey he negotiated the Peace of Bucharest (May 28), and with Sweden not only peace, but alliance (April 5). Napoleon left Paris early in May and went direct to Dresden, where he took care to bind Prussia, Austria, and the other German states more closely to his cause. Then he entered Poland, where he regulated the internal affairs and supervised the mobilization of his army. On June 22 he issued a declaration of war against Russia. The passage of the Niemen was begun on June 24, and by the end of the month Napoleon had 400,000 men across the Russian frontier. The Czar had between 250,000 and 300,000 men under arms, but only about one-half of this number ready to face Napoleon under Barclay de Tolly and Bagration, who conducted a Fabian campaign. Napoleon found the country devastated and abandoned as he advanced, with no enemy to make a stand against him. Like Charles XII, a century earlier, he was being lured to his ruin. At Smolensk (August 17–18) the French encountered the first serious resistance. Napoleon as he advanced had to

leave large bodies of troops along his line of march, and he detached a large force to the northward to capture Mitau and Riga and threaten St. Petersburg. Russian discontent became pronounced as the people saw Barclay de Tolly and Bagration permitting Napoleon to advance unresisted on their ancient capital, Moscow. The two generals allowed themselves to be superseded by Kutusoff, who chose his ground, and on September 7 offered battle to the French at Borodino (q.v.). It was the bloodiest battle of the century, the losses probably aggregating 40,000 on each side. The loss to Napoleon, who could obtain no reënforcements, was fatal, but still he pressed on and entered Moscow (September 14) only to find himself robbed of the fruit of victory by the terrible conflagration which broke out two days later. With a folly that seemed madness, Napoleon lingered in the city until October 19 before beginning the retreat. The hard-fought drawn battle of Malo-Yaroslavitz (October 24) compelled Napoleon to retreat by the same desert road on which he had advanced, instead of by a more southerly route through country not yet devastated by war. Sufferings from the cold and from lack of food were intensified by the constant presence of the Russians on the flanks and in the rear. The expected supplies were not found at Smolensk, and the sufferings of the French reached their terrible climax at the crossing of the Beresina (November 26–28), where thousands perished in spite of the heroic efforts of Oudinot and Ney. A week later Napoleon turned over the command to Murat and hastened to reach Paris and organize a new army before the news of the great disaster should become known in western Europe. Ney, the bravest of the brave, in command of the rear guard, protected the retreat, but only 20,000 out of the 400,000 who had crossed the Niemen in June recrossed it in December. The disaster, however, was greater than the mere loss of an army of 400,000 men. Napoleon had lost his prestige, and henceforth Castlereagh, the English Foreign Minister, and the Czar Alexander supplanted Napoleon as controllers of the destinies of Europe. The Czar advanced into eastern Prussia, where he installed as Governor the ex-Minister Stein, who placed himself at the head of a great Prussian patriotic rising against Napoleon. Driven by this outburst of national spirit, Frederick William III signed an alliance with the Czar at Kalisz (Feb. 27, 1813). Austria, under Metternich, hesitated between Napoleon and Alexander and offered to mediate. Napoleon sent into Germany a new army made up of conscripts and of troops withdrawn from Spain, and on April 29, at Weimar, assumed the direction of the campaign of 1813, which he had decided to fight on the line of the Elbe, where Eugène de Beauharnais and Davout were struggling to check the Russians and repress the Prussians. Successes at Lützen and Gross-Görschen (May 2) on the great plain around Leipzig enabled Napoleon to occupy Dresden as his base of operations and to advance to Bautzen, where he defeated the allies on May 20–21.

Napoleon should have followed up this movement with vigor, but he hesitated because of the untrained condition of his army and of the attitude of Austria. Bernadotte, after the Treaty of Stockholm with England (March 3), had landed at Stralsund, prepared to take an active part in the overthrow of Napoleon, whom he had learned to hate bitterly. Moreau, the only surviving French rival of Napoleon, was summoned from America to act as chief adviser of the allies. England signed new treaties with Prussia and Russia (June 14–15), and the Czar and Metternich signed at Reichenbach (June 27) a secret treaty, by which Austria bound herself to join the allies if Napoleon did not accept her proposals before the expiration of the truce on August 10. This was equivalent to a treaty of alliance, for it was certain that the Congress of Prague would accomplish nothing. On August 10 the Austrian army under Schwarzenberg began operations in Bohemia in concert with the allied army under Blücher in Silesia. The victory of Wellington at Vittoria (June 21, 1813) encouraged the allies and made a great victory an absolute necessity to Napoleon, who promptly took the offensive and attempted to force a battle with Blücher near Görlitz and crush him and then turn against Schwarzenberg. Blücher evaded battle, and Schwarzenberg advanced to attack Dresden. Napoleon reached Dresden just in time and on August 26–27 won his last great victory. (See DRESDEN, BATTLE OF.) For the moment Dresden was saved, but the success was more than offset by the defeats inflicted upon his subordinates, Oudinot at Grossbeeren (August 23), Macdonald on the Katzbach (August 26), Vandamme at Kulm (August 29–30), and Ney at Dennewitz (September 6). The losses of Napoleon during the 10 days' campaign were almost overwhelming and irretrievable, while reënforcements speedily made good the losses of the allies. Napoleon failed to appreciate that the line of the Elbe had become untenable from the moment that Austria joined the allies, and instead of falling back of the Rhine and offering to negotiate, he continued to struggle to hold Dresden. Constant rains and bad roads had been an important factor in the August campaigns and prevented Napoleon, in spite of his boundless energy and activity, from accomplishing anything in September. This failure was fatal, for in October the allies, who had defined their relations in the Treaty of Toplitz (September 19), took the offensive and developed their campaign with such skill that Napoleon was completely deceived until they had nearly completed their dispositions. Blücher, unperceived, crept around Napoleon's left, got in touch with Bernadotte, and advanced towards Leipzig from the north, while Schwarzenberg was advancing from the south towards the same place. Napoleon left Gouvion Saint-Cyr to hold Dresden and hurriedly concentrated all available forces to protect Leipzig and hold his lines of communication. For three days (October 16, 18, and 19) "the Battle of the Nations" raged around Leipzig, and on the last day the French were driven out of Leipzig in a disastrous rout. (See LEIPZIG, BATTLES OF.) Napoleon retreated hastily behind the Rhine, stopping only to destroy, at Hanau (October 30), the army of Bavaria, which had recently joined the allies. Napoleon made a serious mistake in leaving able lieutenants with large garrisons to hold the great German fortresses, thus depriving himself of the assistance of Rapp, who held Danzig with 8000 men, Davout, who was shut up in Hamburg with 12,000 men, and many others. These places were besieged and captured by the allies during the ensuing months, but the bulk of the allied army pressed on towards Paris. Blücher

with the Prussians and part of the Russians crossed the Rhine at Caub (December 31) and began the invasion of France. Schwarzenberg, with the Austrians and the rest of the Russians, entered France by the way of Basel. To meet this double invasion, Napoleon could only muster a small army. This he interposed between Blücher and Schwarzenberg, whom he defeated in turn. Blücher's army was dispersed in the battles of Brienne, Champaubert, Montmirail, and Vauchamps, between Jan. 29 and Feb. 14, 1814, while divisions of Schwarzenberg's army were severely worsted at Nangis (February 17) and Montereau (February 18).

This first defensive campaign of 1814 is one of the most brilliant defensive fights in military history. The military genius of Napoleon never shone more brightly, though the dulling of his political sense made his failure inevitable. With a little army of worn-out and defeated men, reënforced by a few hastily collected and untrained conscripts, he thrust himself between two vastly superior forces against which he hurled himself alternately with such swiftness, skill, and violence as to shatter the hostile armies and frustrate the plans of the opposing generals. Finally, worn out, he had to succumb to the overwhelming numbers of the foe and to the insuperable obstacles of time and space.

Napoleon, who had refused to accept the proposals of Frankfort submitted by the allies on Nov. 9, 1813, now sent Caulaincourt to meet their representatives in the Congress of Châtillon (Feb. 3–March 19, 1814), but with instructions to "sign nothing." The allies once more defined their relations to one another in the Treaty of Chaumont (March 1), brought up new troops, and prepared to crush Napoleon. Napoleon's second defensive campaign of 1814 was a brilliant failure—a stubborn struggle against the inevitable. The first blows were struck at Blücher on March 7 and 9 at Craonne and Laon, but failed to interrupt Blücher's campaign seriously. An attack upon a part of Schwarzenberg's army at Arcis-sur-Aube met with no better success, and so Napoleon turned to the eastward to threaten Schwarzenberg's line of communication. But the great disparity of forces enabled the allies to neglect this movement and to concentrate on Paris. Schwarzenberg and Blücher arrived before Paris on March 30, and after hard fighting with Marmont, Mortier, and Moncey, occupied the French capital. The Emperor arrived just a few hours too late to strike a blow in defense of his capital, and could only make an obstinate attempt to renew the struggle south of Paris, but Ney and the other marshals finally forced him to listen to reason (April 4) and to bring the campaign to a close. In the southwest Soult had been driven from position to position and was about to lose his last battle at Toulouse. Suchet had withdrawn from Spain too late to help Soult; Augereau at Lyons had failed to disturb Schwarzenberg's left flank. In Italy Murat had deserted to the enemy, negotiated with Austria, and turned the Neapolitan army against Eugène Beauharnais, the Viceroy of Italy, who faithfully and ably faced the triple danger of Murat's treachery, the invasion of the Austrians, and the occupation of Genoa by an English force under Lord William Bentinck. On April 11 Napoleon, the Emperor of the French, formally abdicated at Fontainebleau in favor of his infant son, the King of Rome.

In the stipulations with the allies Napoleon was allowed to retain the title and state of Emperor, but was to be detained as a prisoner on the island of Elba. The relations between the newly restored Bourbons and the allies were settled by the First Treaty of Paris on May 30. The changes which had taken place in Europe since the outbreak of war in 1792 had been such that the old order could not be restored, and accordingly a congress of the Powers was summoned to meet at Vienna to make the necessary new arrangements. These were completed on June 9, 1815. But in the meantime Napoleon had left Elba, landed in France on March 1, made his way to Paris, reëstablished his power, gathered a new army, and advanced to attack the allies, whose representatives at Vienna planned at once to place new armies in the field and overthrow him a second time. (See HUNDRED DAYS.) The campaign, which lasted only a week, included Napoleon's defeat of Blücher at Ligny (q.v.) on June 16, Ney's fight with Wellington at Quatre-Bras on the same day, and the final overthrow of Napoleon on the field of Waterloo (q.v.) by Wellington and Blücher on June 18, 1815. After this last battle Napoleon fled to Paris, where he abdicated a second time on June 22. For a few days he hesitated between dreams of again playing a part in France and plans for an escape to America. The first was preposterous, the second impossible, and on July 15 he surrendered himself to Captain Maitland on board the English ship *Bellerophon*. The allies under Blücher had entered Paris a second time, on July 7, and made the final adjustments for the settlement of Europe in the Second Treaty of Paris on November 20. Napoleon was taken to England, and after some deliberation his request to be permitted to settle in England was refused. He was transferred to the ship *Northumberland* and on October 16 landed on the island of St. Helena. In his captivity he was accompanied by his faithful friend Bertrand, and by Gourgaud, Montholon, Las Cases, and a number of other individuals of minor importance. In 1816 Sir Hudson Lowe, a British soldier, arrived as Governor of the island. Napoleon's chief occupations as a captive were his quarrels with Lowe and his monologues with Gourgaud and Montholon, which they wrote out and submitted for correction to the Emperor. These documents form a partial autobiography, valuable not for its facts, but for the light which it sheds upon Napoleon's character. Napoleon gave himself up to long periods of gloom and humored himself in the most inexcusable obstinacies when a more rational behavior would have improved his health and rendered his surroundings more agreeable socially. Cancer of the stomach, which had carried off his father and which was to cause the death of two of his sisters, was slowly undermining his health, and on May 5, 1821, he breathed his last at the set of sun. He was buried with military honors upon the island, but, in accord with his own request, his remains were in 1840 taken from the island, attended by the faithful Bertrand, and under the direction of Louis Philippe placed in a magnificent sarcophagus beneath the dome of the Hôtel des Invalides in Paris. After his death and the restoration of the Bourbons a romantic tradition gathered about the name of Napoleon, which found expression in the literature of the period, notably the poetry of Béranger. He appeared to

many the champion of the people, the bearer of the gospel of the French Revolution to the world, a martyr to the lost cause of democracy. It is in this rôle that he is portrayed in *The Napoleonic Ideas* of his nephew, Napoleon III. To others he was the archadventurer, the traitor to the democratic cause, who exploited the results of the Revolution for his own ends and used the Revolutionary phraseology and idealism to cloak a tyranny more dangerous because more effective than the despotism of the old régime. He is significant historically not merely for the magnitude of his military exploits but for the ideas that these embodied in his own mind and in that of the French people. Napoleon carried to the world by force of arms the ideas of eighteenth-century France. The fabric of feudalism with all its inconsistencies and absurdities crumbled at his touch and in its place appeared the foundations of the nineteenth-century state, strange compound of political democracy and economic class rule. But it was the middle classes who now occupied the dominant position of the old feudal aristocracy. And it was a modern middle-class state with efficient centralized administration, uniform law, postal service and coinage, popular education and popular representation, and freedom of contract in economic matters that Napoleon made possible in every country of Europe to which his influence extended. The remnants of serfdom, the privileges, legal and economic, of the mediæval Church and the landed aristocracy, the archaic political system, in which despotism was combined with disorganization and maladministration, gave way before the bureaucratic, businesslike, logically organized modern state, with a modern ruler at its head, of a type embodied later in Bismarck and Napoleon III—one who was able to yoke the new democracy to the service of an oligarchy, whether plutocratic or aristocratic, who could rear a new despotism under cover of representative institutions and could appease the popular aspirations in internal politics with a brilliant foreign policy and an appeal to the enthusiastic young nationalism to which the downfall of the feudal régime had given birth.

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* This is also in French translation.
† This is also in English translation.

Tolly. For later works, consult: B. E. O'Meara, *Napoleon at St. Helena* (2 vols., London, 1888); Rosebery, *Napoleon: The Last Phase* (New York, 1900). J. H. Rose, *Napoleonic Studies* (London, 1906); Oscar Browning, *The Fall of Napoleon* (ib., 1907); H. A. L. Fisher, *Bonapartism* (Oxford, 1908); Frédéric Masson, *Napoleon and his Coronation* (Eng. trans., Philadelphia, 1911); J. H. Rose, *Personality of Napoleon* (New York, 1912), Lowell lectures; H. A. L. Fisher, *Napoleon*, in "Home University Library" (ib., 1913); T. D. Pillan, *Real Martyr of St. Helena* (ib., 1913); Hector Fleischmann, *Unknown Son of Napoleon*, translated by A. R. Allinson (ib., 1914); W. H. Hudson, *The Man Napoleon* (ib., 1914); F. J. Maccunn, *Contemporary English View of Napoleon* (ib., 1914); V. M. Montagu, *Napoleon and his Adopted Son* (ib., 1914); F. L. Petre, *Napoleon at Bay, 1814* (ib., 1914); G. J. W. Wolseley, *Decline and Fall of Napoleon* (3d ed., Philadelphia, 1914); Norwood Young, *Napoleon in Exile at Elba, 1814–15* (Philadelphia, 1914); id., *Napoleon in Exile on St. Helena* (2 vols., ib., 1915). The best selected bibliography on Napoleon I and his epoch is to be found in *Cambridge Modern History*, vol. ix (New York, 1906).

NAPOLEON II. Son of Napoleon I. See REICHSTADT, DUKE OF.

NAPOLEON III, CHARLES LOUIS NAPOLEON BONAPARTE (1808–73). Emperor of the French. He was the third son of Louis Bonaparte, King of Holland, and of Hortense Beauharnais. (See BONAPARTE.) The law of succession enacted under the First Empire gave the crown, in default of direct descendants of the Emperor, to the sons of either Joseph or Louis Bonaparte. Joseph being childless, the sons of Louis became heirs apparent of the Napoleonic pretensions. Louis Napoleon was born April 20, 1808, in Paris. He spent his boyhood with his mother at her château of Arenenberg in Switzerland, and at Augsburg, where he studied in the Gymnasium. After the death of his elder brother in 1831, he returned to France with his mother, but they were expelled by Louis Philippe, went to England, and thence returned to Switzerland. The death of the Duke of Reichstadt (July 22, 1832), only son of the first Napoleon, left Louis Napoleon the representative of his family, and thereafter the restoration of the Napoleonic Empire became his fixed idea. During the next four years his published works kept him before the French people. Among them were: *Rêvéries politiques; Projet de constitution; Deux mots à M. de Chateaubriand sur la duchesse de Berri* (in verse); *Considérations politiques et militaires sur la Suisse.* In 1836, believing in the weakness of the July monarchy, he undertook at Strassburg a coup which was so absurd a failure that it covered him with ridicule. He was sent to America, but returned to Europe on account of his mother's illness. She died Oct. 3, 1837, and soon afterward the French government asked for his expulsion by Switzerland. He went to London, where, in 1838, he published the *Idées napoléoniennes*, which had considerable circulation in France. In this interpretation of the ideas of the first Napoleon, whom he pictures as the protagonist of the ideas of the French Revolution of 1789, he outlines his own political philosophy, which was a strange combination of Cæsarism with a revolutionary democracy verging on Socialism. In 1840 he made at Boulogne his second attempt to bring about a military uprising in his favor, but this was as complete a failure as its predecessor. He was imprisoned in the fortress of Ham, where he wrote several works, some political articles, and had a share in editing the *Dictionnaire de la conversation.* He escaped from Ham, May 25, 1846, and made his way to the Belgian frontier and thence to England. He hastened back to France when the Revolution of 1848 broke out, but, although he professed devotion to the provisional government, he was distrusted and asked to leave the country. Notwithstanding his promise to do this, he obtained an election to the National Assembly for Paris and three other departments. He took his seat on June 13, 1848, but resigned on the 15th, after a stormy debate, and left France. He was, however, elected from five departments in September, and returning became a candidate for the presidency. He received 5,500,000 votes in the election of Dec. 10, 1848, his closest opponent, General Cavaignac (q.v.), having 1,500,000. He entered upon his office on December 20. His presidency was a continuous contest with the majority in the Assembly, who continued to doubt the sincerity of the President's devotion to the Republic. This disturbed condition was ended by the coup d'état of Dec. 2, 1851, a thoroughly Napoleonic stroke, carried out with blunt disregard for law or political honesty, by the President himself, assisted by Morny, Maupas, and Saint-Arnaud. The cost of success was the establishment of a repressive tyranny maintained by military force. France submitted to the new ruler, who promised to restore the glories of the past. On December 20–21 the President was reëlected for 10 years by more than 7,000,000 votes, practically without opposition. He had revived the plebiscite, used with such effect by his uncle—a plebiscite so managed that the issue was a foregone conclusion. In the same way, when he had himself proclaimed Emperor, as Napoleon III, just a year after the coup d'état (Dec. 2, 1852), it was made to appear that this also was in accordance with the popular will. The new Emperor had studied his uncle's methods and attempted to imitate him as far as circumstances and his own ability would permit, but he only won for himself the name of Napoleon the Little. He possessed ability, but it was that of the politician rather than of the statesman. He lacked the dash and rapidity of decision which were the chief elements in accomplishing the vast schemes of the first Napoleon. Napoleon III hesitated in deciding upon a policy and was slow in carrying it out when once determined. Some conspiracies against him developed as early as 1853, and three attempts were made to assassinate him—by Pianori and Bellamare in 1855 and by Orsini (q.v.) in 1858.

Napoleon III was looked upon coldly by the "legitimate" sovereigns of Europe, but the aim of his foreign policy was to make France again dominant in European affairs and himself the general arbiter of the Continent. To check the similar pretensions of Nicholas I of Russia in eastern Europe, he joined England in protecting Turkey against Russian aggression, and France took the leading part in the Crimean War (q.v.). The pacification which followed and the adjustment of the Eastern Question (q.v.) were arranged by a congress at Paris. (See PARIS, TREATIES OF.) The three eastern Powers, Russia, Prussia, and Austria, which were the

strongholds of legitimacy and autocracy, as against the democracy of France and England, were Napoleon's natural opponents. In the Crimean War he administered a lesson to one of them. By befriending Italy, which under the leadership of Sardinia was struggling to free itself from Austrian oppression, he found an opportunity to strike at Austria and to uphold in the most marked manner his favorite political hobby, the principle of nationalities. He encouraged Cavour (q.v.) in the advocacy of Italy's cause at the Congress of Paris, and, though the attempt of Orsini upon the Emperor's life almost destroyed the cordial relations that had been cultivated between the courts of Paris and Turin, under Cavour's shrewd management the Emperor finally became more friendly than ever. The two held a private conference at Plombières, July 20, 1858, at which Napoleon agreed to support Sardinia in case of an attack by Austria. Cavour at once forced Austria into aggressive action, and Napoleon, now half repentant of his engagement, took the field. The Italian campaign of 1859, in which Napoleon showed himself utterly incapable of military leadership, was marked by two great battles, Magenta and Solferino, won by the allies. Napoleon then selfishly closed the struggle by the preliminaries of Villafranca. (See CAVOUR; ITALY.) He exacted from Victor Emmanuel the cession of Nice and Savoy, although he had failed to deliver Venetia and the duchies. His later relations with Italy were disturbed by the fact that he felt called upon to uphold the Pope in his temporal possessions, and thus clashed with the national ambition of the Italians for complete unity with Rome as the capital. The protection of French troops was only withdrawn from the Papal States when war with Prussia had begun. During the Civil War in the United States (1861–65) Napoleon took an active part with the English government in the diplomatic intrigues against the United States. He took advantage of the disturbed condition of Mexican affairs and of the preoccupation of the United States to revive his uncle's dream of a Latin-American empire under French protection, by establishing the Archduke Maximilian on the new Imperial throne of Mexico by means of French bayonets. Secretary Seward warned the French Emperor that the government of the United States could only consider this as an infringement of the Monroe Doctrine and an unfriendly act, but no attention was paid to this protest until the termination of the Civil War made it possible to send General Sheridan with an army of seasoned troops to the Mexican frontier, when the French troops were removed and the unstable Mexican Empire collapsed (1867). This struck a great blow at the prestige of the Emperor. In 1863–64, when the Schleswig-Holstein (q.v.) question engaged the attention of the Powers, Napoleon refused to aid Denmark in her fight for the duchies and advocated the recognition of the principle of nationalities through the union of the German portion of the duchies to Germany. On the eve of the War of 1866 Napoleon entered into negotiations with both Prussia and Austria with respect to an alliance, but he was foiled by Bismarck's diplomacy, and the swift issue of the Seven Weeks' War (q.v.) revealed to Napoleon a new military power under masterful guidance, threatening his schemes for European control. Austria ceded Venetia to Napoleon with the understanding that it was to be made over to Italy. This was his last appearance in the rôle of an arbiter in the affairs of Europe.

The internal history of the Empire divides itself into two periods—that of the autocratic and that of the liberal Empire. The former Carbonaro risen to power became a powerful enemy of the democratic movement. At the outset he brought under his own control the finances and public enterprises; public liberty was restricted, and a thorough system of police espionage was organized. Napoleon married, Jan. 30, 1853, Eugénie de Montijo, a young Spanish countess, and gratified his own ambitions and her tastes with a brilliant, extravagant, and frivolous court. The Empress Eugénie's influence was always exerted in the interest of the Ultramontane Catholic party. In these days of his absolute power Napoleon pushed public improvements with great energy. Philanthropic institutions were multiplied in France; industrial development was encouraged; and an era of great material prosperity followed, degenerating into one of speculation and luxurious living in which were the seeds of decadence. Railroads and highways were constructed and lines of steamships were established and subsidized. Canals were built and harbors improved. Manufactures, agriculture, and forestry were all fostered by the state. Stock companies were created, and the *crédit foncier* and the *crédit mobilier* stimulated these enterprises with financial support. Paris, under the Prefect Haussmann, was transformed. As early as the exposition of 1855 Paris was able to show a new city to its visitors, and at the brilliant exposition of 1867 this development was still more marked. Politically there were three parties in opposition—Legitimists, Orleanists, and Republicans. Of these the Legitimists were almost lost sight of, with the exception of a few irreconcilable leaders. The Orleanists were stronger in numbers and in the quality of their adherents and gave the Emperor more anxiety. The great literary leaders were found in their camp, and the French Academy was their stronghold. The really active opposition, however, lay with the Republicans. None of these parties had any legal means of expression or action. In 1858, after the Orsini attempt, the General Security Act was forced through the Corps Législatif, giving the government power to exile or transport without trial any person convicted of a political offense. Wholesale arrests were made under this act for the purpose of intimidating the Republicans. Having alienated the Ultramontanes, upon whose support he had hitherto depended, by the Italian war, Napoleon relaxed some of his repressive measures to gain the support of the Liberals. In 1859 an amnesty decree allowed the return of the exiles of 1851. This was followed by a grant of more freedom of action to the Corps Législatif. The commercial treaty of 1860 with England abolished the prohibitions and lowered many of the high protective duties which had formed a part of the Emperor's commercial system. The restrictions upon the freedom of the press were partially removed. A Liberal opposition now began to organize through a coalition of the opposition parties, and after 1863 there was real parliamentary activity in France. A section known as Liberal Imperialists supported the Emperor, but opposed his reactionary ministers. The ministry, headed by Rouher, and with Drouyn

de Lhuys in charge of foreign affairs, favored a vigorous attitude of opposition to Prussia. The Emperor was broken in health, and after the Prussian triumph over Austria had demoralized his plans and left him discredited with his own ministers, he turned for support to the constitutionalists in the Corps Législatif. The liberties of that body and of the press were much extended, and the right to hold public political meetings was conceded. In 1869 a responsible ministry was granted.

In 1870 the following proposition was submitted to a plebiscite: "The French nation approves the liberal reforms made in the constitution since 1860, and ratifies the senatorial decree of April 20, 1870." This was opposed by the Republicans, but was carried by a vote of 7,000,000 to 1,500,000. This popular support of the Imperial régime was apparent rather than real. Notwithstanding temporary coalitions, the different parties were still irreconcilable. The autocratic and war party, which had voted in the affirmative on the plebiscite, came again into power in the Corps Législatif, with the Duke of Grammont in charge of foreign affairs. Partly compelled by the diplomacy of Bismarck and partly actuated by their own aims, the ministry brought on the war with Prussia, much against the will of the Emperor. (See FRANCO-GERMAN WAR.) The Emperor went to the front, leaving the Empress as Regent, and she constituted a ministry of the war party under General Palikao. Napoleon was captured at Sedan (Sept. 2, 1870), and on the 4th of September was taken to the castle of Wilhelmshöhe, near Cassel. In the wild confusion that attended the news of defeat in Paris and the declaration of the Republic, the Empress fled from the city and went to England, taking up her residence at Chiselhurst, Kent, where she was joined by Napoleon in 1871, after the conclusion of peace. He resided there until his death, Jan. 9, 1873.

Napoleon and Eugénie had one child, a son, Eugène Louis Jean Joseph, Prince Imperial of France, born March 16, 1856. See NAPOLEON, EUGÈNE LOUIS JEAN JOSEPH.

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NAPOLEON, EUGÈNE LOUIS JEAN JOSEPH (1856–79). The only son of Napoleon III of France; better known as the Prince Imperial. He was born in the Tuileries in Paris, March 16, 1856. At the outbreak of the Franco-German War of 1870–71 he accompanied his father to the front and was first under fire at Saarbrücken. When the war began to go against the Imperial arms, however, he was sent to England, where he joined his mother after her flight from Paris. From 1872 to 1875 he attended the artillery school at Woolwich. Upon the death of his father he took the title of Count of Pierrefonds. In 1874 he reached his majority and was proclaimed as Napoleon IV by his adherents. Five years later he joined a British expedition against the Zulus, and while reconnoitring was ambushed and killed (June 1, 1879). He was buried beside his father at Farnborough, England. Consult: Ellen Barlee, *Life of Napoleon, Prince Imperial of France* (London, 1889); M. d'Hérisson, *Le prince impérial* (Paris, 1890); André Martinet, *Le prince impérial* (ib., 1895); R. Minon, *Les derniers jours du prince impérial sur le continent* (ib., 1900); Ernest Barthez, *Empress Eugenie and her Circle* (New York, 1913).

NAPOLEON, JOSEPH CHARLES PAUL, PRINCE (1822–91). A son of Jerome Bonaparte. See BONAPARTE.

NAPOLEON GUN. See ARTILLERY.

NAPOLÉON LE PETIT, *le pe-tē* (Fr., Napoleon the Little). A violent satirical attack on Louis Napoleon by Victor Hugo, written at Brussels in 1852.

NAPOLEON'S TOMB. The magnificent burial place of Napoleon Bonaparte is under the dome of the Invalides, Paris. It was constructed by Visconti and has the form of a circular crypt 20 feet deep and 36 in diameter, open at the top. On the granite walls are 10 marble reliefs by Simart. The mosaic pavement, representing a laurel wreath, bears the names of various battles. In the middle rises the red porphyry sarcophagus, 13 feet long, 6½ wide, and 14½ high, cut from a single block weighing 67 tons, surrounded by 12 victories by Pradier. Above the entrance to the crypt is a sentence from Napoleon's will: "I desire that my ashes shall rest on the banks of the Seine, in the midst of the French people that I have loved so well." On one side is the sarcophagus of the Emperor's friend Duroc, who fell at Bautzen in 1813, on the other that of his faithful companion Bertrand, who shared his captivity. Napoleon's remains were brought from St. Helena to their present burial place by the Prince de Joinville in 1840.

NAPOLÉON-VENDÉE, vän'dā'. A former name of Roche-sur-Yon (q.v.), a town in France.

NAPRAVNIK, nä-präv'nĕk, EDWARD FRANZEVICH (1839–). A Bohemian pianist, conductor, and composer. He was born at Bejšt, near Königgrätz, and studied at the Prague Organ School in 1853–54. He became an instructor in the Maydl Institute for Music at Prague in 1856, and in 1861–63 he directed Prince Yussupoff's private orchestra at St. Petersburg (now Petrograd). In the latter year he was appointed organist of the Imperial Russian Opera, of which he became second conductor in 1867 and chief conductor in 1869. His operatic productions include: *The Inhabitants of Nizhni Novgorod* (1868); *Harold* (1886); *Dubroffsky* (1895); *Francesca da Rimini* (1903). He composed also the overture *Vlasta* (1861); the symphonic poem, *The Demon* (1879); other orchestral selections; and Bohemian and Russian songs.

NAQUET, nä'kā', ALFRED JOSEPH (1834–). A French politician and social reformer, born at Carpentras, Vaucluse. In 1863 he became professor in the medical faculty at Paris and later in the same year professor of chemistry at Palermo, Italy. Returning to France in 1865, he was sent to prison for 15 months in 1867 for his membership in a secret society. Upon the publication of his book, *Religion, propriété, famille* (1869), he was compelled to flee to Spain, but he returned to participate in the revolution of 1870. In 1871 he was elected a deputy for Vaucluse in the National Assembly, where he joined the party of the Extreme Left. He was reëlected in 1876 and 1881, served as a Senator in 1882–89, and was a deputy for Paris in 1890–98. He began his agitation for a divorce law in 1876 in the Chamber of Deputies, and finally secured its adoption in the Senate in 1884. Naquet is author of *Principes de chimie fondés sur les théories modernes* (1865; 5th ed., 1890; Eng. trans., 1868); *La république radicale* (1873); *Le divorce* (1877; 2d ed., 1881); *Questions constitutionnelles* (1883); *Socialisme collectiviste et socialisme libéral* (1890; Eng. trans., *Collectivism and Socialism of the Liberal School*, 1895); *Temps futurs* (1900); *L'Humanité et la patrie* (1901); *La loi du divorce* (1903); *L'Anarchie et la collectivisme* (1904); *Désarmement ou alliance anglaise* (1908).

NARA, nä'rä. The capital of a prefecture of the same name on the island of Hondo, Japan, situated 25 miles by rail southeast of Osaka (Map: Japan, D 6). It was the capital of Japan from 709 to 784. The most interesting temples are the Kasuga, situated in a magnificent park; the Todai-ji with its huge bell, over 13 feet high and more than 9 feet in diameter, and the gigantic statue of Buddha, over 53 feet high; and the Kokubu-ji with the modern statues of Brahma and Indra. Of great archæological value is the storehouse in which specimens of articles used in the Imperial household for over a thousand years have been preserved. The local museum is also of considerable archæological interest. The principal manufactures of Nara are India ink, fans, and modern toys. Pop., 1898, 30,539; 1908, 32,732.

NARAKA, nä'rä-kä (Skt., hell). The hell of the Hindus. The doctrine of a place for the bad, though not necessarily a place of torment, is as old as the Veda. This region was one of bottomless darkness beneath the earth. The faith of the Brahmanic period and of the Upanishads had the same belief, and the descriptions of hell torments became fully developed later. Manu enumerates 21 hells and gives a general description of the tortures which await the impious there. The Puranas, however, are more systematic. The Vishnu-Purana, e.g., not only names 28 such hells, but distinctly assigns each of them to a particular class of sinners. Consult Lucian Scherman, *Materialien zur Geschichte der indischen Visionslitteratur* (Leipzig, 1892), and E. W. Hopkins, *Religions of India* (Boston, 1895).

NARAM SIN ('beloved of Sin'). A Babylonian king of the dynasty of Akkad. He was long supposed to be the son of Sargon I, the founder of the dynasty; but a close study of the list of kings published by Scheil in 1911 tends to render it probable that he was the son of Sharganisharri, or Sargon II, the fourth king of the dynasty, who was apparently often confused with Sargon I. Though Sargon I, Manishtusu, and Rimush are called "kings of Kish," it is held by many scholars that they were the first three rulers of the dynasty of Akkad. Naram Sin fought with Magan in east Arabia, and with the Lulubians. He ruled at Susa, as an Elamitish inscription shows. A statue of this King has been found north of Diarbekr. It is possible that he made a raid on Cyprus. His features are purely Semitic. According to Nabunaid, he reigned 3200 years before his time, i.e., c.3750 B.C. Some scholars have doubted the accuracy of this statement, assuming either a textual error for 2200, a calculation based on the precession of the equinoxes, each degree being reckoned at 100 years instead of 72, or a fancy of the ancient chronologists. In view of the long lists of kings for these remote periods, with altogether probable regnal years attached, it would seem most methodical to accept tentatively the date assigned by Nabunaid's scribes. See BABYLONIA. Consult: Scheil, in *Comtes rendus de l'Académie des Inscriptions et Belles Lettres*, pp. 606 ff. (Paris, 1911); Poebel, in *Orientalische Literaturzeitung*, xv, 481 ff. (Leipzig, 1912); Ed. Meyer, *Geschichte des Altertums*, i, 2 (3d ed., Stuttgart, 1913).

NARANJO, nä-rän'hō. A ruined city of the Maya Indians in the Peten region of Guatemala, not far from the boundary of British Honduras. Over 30 monoliths bearing sculptured figures and dates are found at this site. None of the structures has been excavated, but enormous pyramids arranged around courts served as foundations for a great series of religious and civil buildings. The dated monuments furnish important evidence on ancient Mayan history. The city flourished about 500 A.D. Consult: T. Maler, "Explorations in the Department of Peten, Guatemala," in *Memoirs of the Peabody Museum of American Archæology and Ethnology*, vol. iv (Cambridge, 1908); S. G. Morley, "The Inscriptions at Naranjo, Northern Guatemala," in *American Anthropologist*, vol. xi (Washington, 1909); H. J. Spinden, "Maya Art," in *Memoirs of the Peabody Museum of American Archæology and Ethnology*, vol. vi (Cambridge, 1913).

NARAOIA, när'ä-oi'ä. One of the remarkable genera of fossil branchiopod crustaceans recently discovered by Walcott in the Middle Cambrian shale (Stephen formation) of British Columbia. It has two nearly equal carapaces, the one covering the cephalic and the other the

thoracic region, and a large number of legs. See STEPHEN FORMATION.

NARBADA, nŭr-bŭd'ȧ. A river of India. See NERBUDDA.

NARBO. See NARBONNE.

NARBONNE, när'bŭn' (Lat. *Narbo*). A town in the Department of Aude in south France, situated 6 miles from the Mediterranean and 37 miles east of Carcassonne (Map: France, S., H 5). The town is divided into old and new quarters by the Robine Canal. The streets of the former present a poor appearance. The church of St. Just was in olden times the cathedral. It is an imposing though uncompleted structure, begun in the thirteenth century, and exhibiting many of the most daring ideas of the Gothic. The Gothic hôtel de ville is a creation of Viollet-le-Duc. It houses the Narbonne Museum with paintings and ceramics. Narbonne has a hydrographical school, a seminary, a college, and a public library of 15,000 volumes. Its industries include coopering and distilling establishments. It produces verdigris, candles, tiles, pottery, dyes, hoops, mosaic work, tools, and leather. It deals in wine, grain, honey, oil, salt, and sulphur. Its honey is famous, and its red wine is peculiar to the district. It has a chamber of agriculture and an œnological station, the latter established in 1894. The town is on a branch of the important Canal du Midi. About 11 miles to the south is the port La Nouvelle, at the end of the Narbonne Canal. It is the harbor for Narbonne and has some manufactories. Pop., 1901, 28,852; 1911, 28,173. Narbo became Roman in 116 B.C. It was at the time one of the leading ports of the Mediterranean, and well known for its beauty and attractions as a city. *Narbo Martius*, as it was called, was the capital of the Provincia Romana and later of Gallia Narbonensis. In 413 it passed under the sway of the Visigoths, and about 720 it fell into the hands of the Saracens, from whom it passed into the possession of the Franks in 759. The viscounts of Narbonne became hereditary feudatories of the French crown in 1080. In 1447 Viscount William III sold Narbonne to the house of Foix, and in 1507 the fief was united with the French crown. Late in the Middle Ages the harbor of Narbonne became practically filled up and the town began to decline.

NARBROUGH, när'brŭ, SIR JOHN (1640–88). An English admiral and explorer. In 1670 he made a notable voyage through the Strait of Magellan and up the Chilean coast. He greatly distinguished himself at the battle of Solebay in 1672, and was knighted by King Charles II and made rear admiral in 1673. The following year he sailed in command of a squadron to the Mediterranean, where he distinguished himself by scattering the pirates of Tripoli and Algiers. In 1680–87 he was commissioner of the navy, and in the latter year sailed to the West Indies in command of a squadron, and died there of fever while superintending the investigation of a sunken treasure ship. He was buried at sea off Santo Domingo.

NARCEINE, när'sē-ĭn. See ALKALOIDS.

NARCIS'SUS (Lat., from Gk. Νάρκισσος, *Narkissos*, from νάρκη, *narkē*, torpor. The flower has narcotic properties). According to Ovid, *Metamorphoses*, iii, 341–510, the son of the river god Cephissus and of the nymph Liriope of Thespiæ in Bœotia. He was a youth of extraordinary beauty, but refused all suitors, including Echo (q.v.). They prayed to Nemesis for vengeance, and she caused Narcissus to see his own image in a forest spring. Enamored of this, he pined away in hopeless love beside the stream. From his body sprang the flower narcissus, which for a little while is mirrored in the waters and then fades. The story, which seems to be of Alexandrian origin, is told with variations by other late Greek and Roman writers; it is a counterpart to the stories of Adonis (q.v.), Linus (q.v.), and Hyacinthus (q.v.). Consult C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911). The bronze statuette in Naples, commonly called Narcissus, really represents the youthful Dionysus.

NARCISSUS. A genus of beautiful bulbous plants of the family Amaryllidaceæ, with narrow leaves and usually white or yellow flowers. The species are natives of southern Europe, northern Africa, and the temperate parts of Asia. Many are cultivated in gardens for the sake of their beautiful and often fragrant flowers, which in general appear early in the season. Some of them are known by the names of daffodil and jonquil. The different species

NARCISSUS.

a, poet's narcissus (*Narcissus poeticus*); *b*, jonquil (*Narcissus jonquilla*); *c*, trumpet daffodil (*Narcissus pseudonarcissus*).

are naturally separated into two divisions—those bearing but one flower on a scape and those bearing more than one. The poet's narcissus (*Narcissus poeticus*) is perhaps the best known and most popular species. It is a hardy plant and bears white fragrant flowers. The jonquil (*Narcissus jonquilla*) bears from two to five very fragrant golden-yellow blossoms on a scape. This species is employed in the manufacture of perfumes. *Narcissus tazetta* is the narcissus of the ancient Greeks and Romans and is now largely grown as a forcing-house plant. There are numerous varieties of this species with white, yellow, single and double flowers. *Narcissus pseudo-narcissus* is com-

monly called daffodil or trumpet daffodil. The plants are ordinarily propagated by offset bulbs which are produced on the bulb. These usually flower the second year after planting. See JONQUIL; Colored Plate of AMARYLLIDACEÆ; and cut in article CORONA.

NARCOT'ICS (Gk. *ναρκοτικός, narkotikos*, benumbing, from *νάρκοῦν, narkoun*, to benumb, from *νάρκη, narkē*, torpor; connected with OHG. *snerhan*, to draw together, AS. *snear*, Eng. *snare*). Remedies which, in moderate doses, lessen the action of the nervous system. Their full operation is sleep or coma. Opium (q.v.) is the type from which most descriptions of this class of medicines have been drawn; but, although most narcotics more or less resemble opium in their action, almost every one presents some peculiarity in the way in which it affects the system. These medicines are primarily stimulating, especially when given in small or moderate doses; but this stage of their action is comparatively short, and when the dose is large the excitement is scarcely perceptible. Their power of inducing sleep has procured for them the names of hypnotics and soporifics; while many of them are termed anodynes, from their possessing the property of alleviating pain. Next to opium and the general anæsthetics, hyoscyamus, Indian hemp, and chloral may be regarded as the most important narcotics. Cocaine should also be included in the list of narcotics. Of late years a number of coal-tar derivatives have been introduced, such as sulphonal, trional, and veronal, which are taking the place, to some extent, of the older remedies.

It has been already mentioned that there are differences in the mode of operation of the different members of this class. Alcohol, e.g., in sufficient doses produces intoxication; belladonna, delirium; opium contracts the pupil of the eye; hyoscyamus dilates it. Each drug affects the organism in its own peculiar way, and a description of its special qualities will be found in the article devoted to it.

Narcotics are usually administered with the view either of inducing sleep or of alleviating pain or spasm. As, however, their action is much modified by a variety of circumstances—such as age, idiosyncrasy, and prolonged use—they should be administered with extreme caution and only under competent advice. But the effects produced by these narcotics have become so generally known that many persons have availed themselves of these drugs, especially morphine and codeine, heroin, and cocaine. The use became so widespread that severe laws, Federal as well as State, were passed, preventing the indiscriminate sale and use of these drugs. Forty-nine political divisions have some form of cocaine legislation, and 37 have laws restricting the use and sale of opium and its derivatives. (Consult *Efforts to Curb the Misuse of Narcotic Drugs*, reprint No. 267 from the Public Health Reports, Washington, 1915.) The various quack medicines for children which are known as *carminatives, soothing syrups*, etc., contain some form of opium, and formerly were a fertile cause of the great mortality that occurs in early life, especially among the poorer classes; but stringent laws have largely eliminated this evil.

NAR'COTINE, $C_{22}H_{23}NO_7$. One of the organic bases or alkaloids occurring in opium, in which it usually exists in the proportion of 6 to 8 per cent. It is nearly insoluble in water and sparingly soluble in alcohol and ether, but dissolves readily in chloroform. Its solutions turn the plane of polarized light to the left; the solutions of its salts (in the presence of free acids) have the opposite effect. Narcotine possesses very slight alkaline properties; its salts do not readily crystallize and are even more bitter than those of morphine, although the substance itself is almost tasteless. See ALKALOIDS.

NARD. A fragrant plant. See SPIKENARD.

NARDINI, när-dē'nē, PIETRO (1722–93). An Italian composer and violinist, born at Fibiana (Tuscany). He was a pupil of Tartini (q.v.) and from 1753 to 1767 was solo violinist of the court chapel at Stuttgart. From 1770 till his death he occupied the position of court conductor at Florence. He was famous for the absolute purity of his intonation and a beautiful singing tone. His compositions consist of six concertos for violin, six violin sonatas, six string quartets, six flute trios.

NARDÒ, när-dō' (Lat. *Neretum*). An episcopal town in the Province of Lecce, Italy, 34 miles south of Brindisi (Map: Italy, F 4). It has a cathedral, an ancient castle, and old walls, and manufactures woolen goods and tobacco. The surrounding country abounds in olive plantations and vineyards. Pop. (commune), 1901, 14,387; 1911, 16,567.

NAR'DUS (Lat., nard, from Gk. *νάρδος*, from Pers. *nard*, from Skt. *nalada*, Indian spikenard). A genus of one species of grass (*Nardus stricta*), often called matgrass, a purplish perennial growing in tufts characteristic of dry elevated situations in Europe, Australia, etc. It has little or no feeding value.

NARES, nârz, SIR GEORGE STRONG (1831–1915). A British Arctic explorer, born at Danestown, Scotland. He entered the navy in 1846 and went on the *Resolute* in the Arctic expedition of 1852. In 1872–74 he commanded the famous *Challenger* expedition, engaged in deep-sea exploration. In 1875, in command of the *Alert* and *Discovery*, he set out on a polar expedition, and proceeding up Smith Sound he reached with the *Alert* the parallel of 82° 27′, the farthest north any ship had then gone. Markham, his lieutenant, went on sledges in 1876 as far as 83° 20′, another record at the time. Another lieutenant, Aldrich, extended the coasts of Grinnell Land 220 miles to the west, while Beaumont reached St. George Fiord in Greenland and sighted Cape Britannia. An outbreak of scurvy obliged the return of the expedition in 1876. In this year Nares was made K.C.B. In 1878 Nares surveyed Magellan Strait and parts of the Pacific. He served as professional officer of the Board of Trade (1879–96), during this period being made vice admiral (1892), and in 1902 became acting conservator of the river Mersey. He wrote: *Reports on Ocean Soundings and Temperature* (1874–75); *Official Report of the Arctic Expedition* (1876); *Narrative of a Voyage to the Polar Sea* (1878). Consult *Arctic Expedition, 1875–76: Report of the Committee of Enquiry* (London, 1877).

NARES, ROBERT (1753–1829). An English philologist, born at York. After studying at Christ Church, Oxford, he took orders, and from 1798 until his death was canon of Lichfield. As critic, essayist, and theologian he held a high rank among the writers of his time. With the Rev. William Beloe he founded the *British Critic* in 1793. Among his many publications should

be mentioned: *Elements of Orthoëpy* (1784); *Chronological View of the Prophecies Relating to the Christian Church* (1805); *A Glossary of Words, Phrases, Names, and Allusions . . . in the Works of English Authors* (1822), which is by far his most important work.

NAREW, nä′rĕf. A river of west Russia, rising in the Government of Grodno. It flows westward, forming part of the boundary of Poland, and joins the Bug 19 miles north of Warsaw. Its length is 271 miles, 212 of which are navigable. The Augustowo Canal connects it with the Niemen.

NARIÑO, nä-rē′nyō. A maritime department of Colombia, located in the southwestern part of the country. It is bounded by the Department of Cauca on the north, the Intendency of Caqueta on the east, Ecuador on the south and west, and the Pacific Ocean on the west. The department was established in 1904 and has an area of 11,580 square miles. It is composed of three nearly equal regions—the western, between the Pacific and the Western Cordillera; the central, between the Western and Central Cordilleras; and the eastern, east of the Central Cordillera. The western region is arid and uncultivated and is inhabited by whites and negroes. The central region is fertile, producing sugar cane, cacao, rice, potatoes, corn, wheat, and barley. Two-thirds of the inhabitants are white and the remainder Indians. The eastern region is undeveloped, and is inhabited mainly by natives, many of whom are uncivilized. Agriculture and stock raising are the chief occupations. Gold mining is carried on, especially in the west. There are manufactures of Panama hats and of shoes. The department has 510 miles of railway and numerous good highways. Pop., 1912, 292,535. Capital, Pasto (q.v.). A large portion of the territory assigned to this department by Colombia is still in dispute with Ecuador.

NARIÑO, Antonio (1765–1823). A Colombian politician, born in Bogotá. In 1795 he translated and published *The Rights of Man,* for which he was arrested and deported to Spain. He escaped to France and England, where he came in contact with Sá de Miranda (q.v.), returning to New Granada in 1797. During the revolutionary movement he advocated a centralized government and was named Dictator by Congress in 1811. He struggled against the Federalists, but was defeated by Congress, which had espoused this cause. Nariño thereupon resigned, but was reinstated by the citizens of the capital and was again proclaimed Dictator (September, 1812). Civil war broke out, Nariño was defeated, and then came to terms with Congress in order to repel the forces of the new Viceroy, Marshal Montalvo (1813). Having resigned the dictatorship, he was placed in command of the Patriot army. Successful at first, he met reverses, his army was scattered, and he was taken prisoner and sent in irons to Spain (1814).

NARNI, när′nē. An episcopal town in the Province of Perugia, Italy, on the Nera, 1180 feet above the sea and 45 miles north of Rome (Map: Italy, D 3). Ruins of a massive marble bridge built by Augustus and of a very ancient aqueduct are still to be seen. Narni has been the seat of a bishopric since 360; its cathedral of St. Juvenalis dates from the thirteenth century. Other buildings include old churches dating from the ninth to the fifteenth century, the castle, now used as a prison, old houses, and the town hall with a finely sculptured façade. Calcium, leather, rubber, and olive oil are produced. Narni, the ancient Nequinum, was colonized by the Romans about 300 B.C. The Emperor Nerva was born here. Pop. (commune), 1901, 12,725; 1911, 12,943.

NARO, nä′rō. A town in the Province of Girgenti, Sicily, situated at an altitude of 1945 feet above the river Naro, 12 miles east of Girgenti (Map: Italy, D 6). It has a sixteenth-century castle of the Chiaramonti and remains of catacombs, grottoes, aqueducts, and other antiquities. There are large sulphur pits near by. Pop. (commune), 1901, 12,866; 1911, 13,802.

NAR′RAGAN′SET. A former leading Algonquian tribe of New England, occupying most of the territory along the western shore of the bay of the same name, in Rhode Island, and claiming dominion over several smaller tribes of the interior and the islands, including Long Island. They befriended Roger Williams, and through his influence refused to join in the Pequot War. In King Philip's War the Narraganset took a leading part under their chief Canonicus. In the celebrated "Swamp Fight" they lost nearly 1000 in killed and prisoners. Canonicus himself was killed soon afterward. Those who surrendered at the close of the war were settled among their former tributaries, the Niantic (q.v.), the whole body thenceforth being known as Narraganset. There were but 16 individuals in 1910. See Mohegan.

NARRAGANSETT BAY. An inlet of the Atlantic Ocean, extending into Rhode Island (Map: Rhode Island, C 3). It is about 26 miles long, from its entrance to its north extremity (the mouth of the Providence River), and about 4½ miles wide at its mouth, while its maximum width is about 8 miles. It receives the waters of several small rivers, such as the Taunton, and the Pawtuxet, and contains a number of islands, of which Rhode Island (q.v.), Prudence, and Conanicut (q.v.) are the largest. At the head of the bay lies the city of Providence, and Newport is situated near its entrance, on the east shore. Consult E. M. Bacon, *Narragansett Bay* (New York, 1904).

NARRAGANSETT PIER. A noted watering place in Washington Co., R. I., 9 miles from Kingston Station, where a branch line connects with the New York, New Haven, and Hartford Railroad (Map: Rhode Island, C 4). It is delightfully situated near the mouth of Narragansett Bay and has a fine beach and splendid drives. Among other attractions of the resort are its scenery, Narragansett Heights in particular commanding an extended view, and the beautifully colored rocks in the vicinity, which are picturesque also in form. There are a number of handsome summer residences and many hotels. Pop. (Narragansett District), 1900, 1523; 1910, 1250. The first settler came to this neighborhood about 1675, and in 1815 the pier from which the place takes its name was built. It was not until after 1876, when a railroad was completed to this point, that "the Pier" became a favorite summer resort. Near by, in December, 1675, General Winslow, at the head of 1000 colonists, defeated the Narraganset Indians, of whom 300 were killed and about 600 captured, while the whites lost 80 killed and 150 wounded.

NARRENSCHIFF, när'ren-shĭf, DAS (Ger., The Ship of Fools). The most celebrated work of Sebastian Brant (q.v.).

NARSES, när'sēz (c.477–c.572). A celebrated eunuch statesman and general of the Byzantine Empire. He was an Armenian by birth and may have been sold as a slave in childhood. He rose by successive steps to the post of grand chamberlain to the Emperor Justinian. In 532 he aided in suppressing the Nika riot. In 538 he was sent to Italy to act in concert with Belisarius (q.v.) in the war against the Goths. After gaining some successes Narses came into conflict with Belisarius and was recalled to Constantinople in 539. After Belisarius had been recalled Narses was appointed, in 551, to the chief command in Italy. Near Tagina in 552, after a desperate engagement, the Goths were totally defeated and their King, Totila, slain. In the following year Teja (q.v.) was defeated near Sorrento. Narses took possession of Rome, and completely extinguished the Gothic power in Italy. He was appointed prefect of Italy in 554. He fixed his court at Ravenna, and continued till the death of Justinian in 565 to administer the affairs of Italy with vigor and ability. The only blot on the character of his administration is the avarice with which he is charged by his contemporaries. His exactions pressed heavily on the exhausted resources of the population, though their severity may be in some degree palliated by the splendor and utility of the public works on which he partly expended the public revenues. The Romans, on the accession of Justin, complained of the exactions of Narses, and he was recalled. He is accused of intriguing with Alboin, King of the Lombards, to incite an invasion of Italy. This account is improbable, and is not mentioned by any contemporary. Consult: J. B. Bury, *Later Roman Empire,* vol. i (New York, 1889); Thomas Hodgkin, *Italy and her Invaders,* vols. iv, v (Oxford, 1885, 1895); Edward Gibbon, *Decline and Fall of the Roman Empire,* edited by J. B. Bury, vols. iv, v (London, 1898); *Cambridge Medieval History,* vol. ii (New York, 1913). See GOTHS; JUSTINIAN.

NAR'THEX (Lat., from Gk. *νάρθηξ, narthēx,* casket, a sort of tall, hollow-stalked, pithy, umbelliferous plant). A vestibule to a basilica or church, usually extending across the entrance end, either just inside or outside the entrance and façade. The term is used especially of Early Christian and Byzantine architecture, the corresponding part in the West being usually called portico or porch. There were sometimes an *inner* narthex, forming an integral portion of the interior, within the main façade, and an *outer* narthex, attached to the outside of the façade, or with a separate façade. The outer narthex sometimes formed one of the arcades surrounding the atrium. See ATRIUM; BASILICA; CHURCH.

NARUSZEWICZ, nä'rōō-shā'vĭch, ADAM STANISLAW (1733–96). A Polish historian and poet, born at Pinsk, Lithuania. He joined the Jesuits in 1748 and was sent by them to France to complete his education. On his return he became professor of Latin at the Vilna Academy. A second journey through France, Germany, and Italy secured for him the directorship of the Collegium Nobilium at Warsaw. Prince Czartoryski introduced him to King Stanislas Augustus, and the two became inseparable. After the suppression of the Jesuit Order he became Bishop, first of Smolensk and then of Lutsk. He died at Janow, Galicia. His chief work, *History of the Polish Nation* (6 vols., 1780–86; new ed., 1859–60), was the first scientific treatise of its kind. It is the result of a critical collation of original documents in the Polish and foreign archives, and deals with the period previous to 1386. A firm believer in the monarchical form of government, he aimed in his history to warn his countrymen against their narrow-minded egotism and the lawlessness and arbitrariness of the nobility. These ideas are forcefully expressed in a poem published in pamphlet form, *Voices of the Dead.* He also wrote a *Life of Chodkiewicz* (q.v.). (1781) and a *History of the Crimea* (1787). The *Idylls* (highly sentimental and declamatory) and *Satires* are the best known of his poetic productions, collected as *Lyrica* (Warsaw, 1778 and repeatedly).

NARVA, när'vȧ. A town, formerly an Esthonian fortress, in the Government of St. Petersburg, Russia, situated on the left bank of the river Naróva, about 100 miles west-southwest of St. Petersburg (Map: Russia, C 3). The town has several Lutheran and Greek churches. The cathedral contains a fine collection of crosses and crucifixes. Narva has a seventeenth-century town hall, an old castle, two Gymnasia, a theatre, and a number of technical schools attached to the extensive cotton and woolen mills in the vicinity. There is a considerable trade in cotton and lumber. Pop., 1897, 16,577; 1911, 21,478, Germans, Esths, and Russians. The town was founded by the Danes in the thirteenth century, and, after being held for a short time by the Russians, passed to Sweden in 1581. Here, on Nov. 30, 1700, an army of about 40,000 Russians under Peter the Great was completely defeated by some 8000 Swedes under Charles XII. In 1704 Peter the Great made himself master of the town.

NARVACÁN, när'vȧ-kän'. A town of north Luzon, Philippines, in the Province of Ilocos Sur (Map: Philippine Islands, C 2). It is situated on the main road, a short distance from the coast and about 13 miles southeast of Vigan. Pop., 1903, 19,575.

NARVÁEZ, när-vä'âth, PÁNFILO DE (c.1480–1528). A Spanish soldier and conquistador. He was born in Valladolid, came to America about 1498, and became lieutenant to the Governor of Cuba, Velazquez. In 1520 Narváez was sent with a body of soldiers to reduce Cortés, then in Mexico, to submission. Landing at San Juan de Ulúa, he was surprised one dark night (May, 1520) and seized in his camp by a party under Cortés himself, who then persuaded the soldiers to join in the conquest of Mexico. After about two years of imprisonment at Vera Cruz, Narváez was permitted to return to Spain. There he secured permission to conquer and govern the territory from Florida to the Río de Palmas (Pánuco River). He sailed from San Lucar, June 17, 1527, with a fleet carrying 600 colonists and soldiers, priests, and negro slaves, with a few women. Stopping at Santo Domingo for horses and supplies, about a quarter of his men deserted in order to join in the exodus towards Mexico and Peru. Thence he went to Santiago de Cuba, where he passed the winter, and on Feb. 20, 1528, he set sail for Florida. On April 14 he anchored near a bay, which he named Bahía de la Cruz (variously identified with Clearwater Bay, Tampa

Bay, and Appalachee Bay). On account of the poor condition of the country Narváez, with 300 men, set out May 1 to march through the country, while the vessels were to follow the shore as far as the harbor of Pánuco. Hopelessly misled by Indian guides, lost in the tangled morasses, hungry and footsore, helpless against the harrying, pestering attacks of unseen natives, the Spaniards struggled along across the country and finally reached a little harbor on Appalachee Bay, which Narváez named Bahía de Caballos. Here from scanty materials they constructed five rude boats, in which the 242 survivors embarked on September 22 to follow the coast westward. When passing the Mississippi the boats were driven to sea by the current and two of them were lost. A storm arose and Narváez disappeared. The survivors of the two remaining boats were cast ashore on an island outside Matagorda Bay (November 6). For the fate of the survivors, see NÚÑEZ CABEZA DE VACA, ALVAR. Consult: J. G. Shea, *The Catholic Church in the United States* (2 vols., New York, 1890–92); Woodbury Lowery, *Spanish Settlements within the Present Limits of the United States, 1513–1561* (ib., 1901); E. G. Bourne, *Spain in America* (ib., 1907); Alvar Núñez Cabeza de Vaca, "Relación," in J. F. Jameson (ed.), *Original Narratives of Early American History*, vol. ii (ib., 1907).

NARVÁEZ, RAMÓN MARÍA, DUKE OF VALENCIA (1800–68). A Spanish general and statesman, born at Loja in Andalusia. In early youth he fought in the war of liberation against the French and in 1822 acted with the Liberals and contributed to the suppression of the revolt in the Royal Guards. He withdrew to Loja in 1823 upon the triumph of the Reactionary party, and lived there in retirement until the death of Ferdinand VII in 1833. He was engaged in the Basque Provinces in 1834, then commanded a division under Espartero, and in November, 1836, routed the Carlist leader, Gómez, near Arcos. In 1838 he cleared the District of La Mancha of brigands, and was appointed, in 1840, captain general of Old Castile and general in chief of the army of reserve. He took part in the insurrection against Espartero that broke out at Seville in 1840, but was compelled to flee to France. He succeeded in 1843 in bringing about the overthrow of the government of Espartero, and was made President of the Council and field marshal, and was created a grandee of Spain of the first class and Duke of Valencia in 1845. He entered upon a thoroughly reactionary policy and revised the Liberal constitution of 1837. Petty insurrections broke out, which the rigorous soldier-statesman repressed with an iron hand. But his dictatorial manners alienated even his personal friends, and his ministry was overthrown (Feb. 10, 1846). After serving as special Ambassador at the French court he returned to power in 1847, but soon afterward quarreled with Queen Christina, and retired from office in 1851. In 1856, on the overthrow of the O'Donnell ministry, he again became President of the Council. Intrigues of the court compelled his resignation in 1857. Once more in power in 1864, he was succeeded in the following year by O'Donnell, with whom he suppressed, in 1866, a military revolt in Madrid. He supplanted O'Donnell in the same year, and, despite the efforts of O'Donnell and Prim, retained power until his death, April 23, 1868. Consult: Mazade, *Les révolutions d'Espagne* (Paris, 1869); Prosper Mérimée, *Lettres à Panizzi* (ib., 1881); Hermann Baumgarten, *Geschichte Spaniens von Anspruch der französischen Revolution bis auf unsere Tage* (Leipzig, 1865–71); Antonio Pirala, *Historia contemporánea* (Madrid, 1871–79).

NARVIK, när'vīk. A town on the west coast of Norway, at the inner end of Ofotfjord, surrounded by beautiful woods and lofty mountains, with a large, deep harbor. The town dates from 1892, when it became the western terminal, the most northern railroad terminal in the world, for Luleå Ofoten Railroad, opened 1902 to carry the huge quantities of iron ore from northern Sweden to the Atlantic coast. The export of Swedish iron ore from Narvik, mainly in Swedish ships, was, in 1911, 2,466,415 tons; in 1914, 3,000,000 tons. Through the Ofoten Railroad it has connections with the railroads of Sweden. A Narvik-Tromsö railroad is planned. The town has steamship connections with other coast towns. It exports fresh fish to Sweden, and has schools and newspapers. Pop., 1898, 50; 1910, 4643.

NARWHAL, när'wal (from Swed., Dan. *narhval*, Icel. *nahvalr*, probably from Icel. *nar*, corpse + *hvalr*, whale; so called from the pale

SKULL OF NARWHAL.

The lower jaw has been removed, and the view is of the roof of the mouth, which has been partly cut away to show the deep insertion of the root of the tusk (on the left-hand side) and the abortive tooth on the right-hand side of the upper jaw.

color of the skin). A cetacean of the family Belugidæ, resembling the white whale in form and in the want of a dorsal fin, but remarkably characterized by having no teeth except two in the upper jaw, supposed to be canines, one and occasionally both of which (in the male) develop into spirally twisted straight tusks passing through the upper lip and projecting like horns in front. When, as usually, only one is so produced, it is always the left one. Only one species is known (*Monodon monoceros*), of Arctic seas, where narwhals are often seen in great numbers among the ice fields and in the creeks and bays, always active and playful. A mature narwhal is generally about 15 feet in length, besides the tusk, which is from 6 to 10 feet long. The tusk is hollow nearly to the point, and is spirally grooved. Its use is rather conjectured than known; it is probably a weapon of defense, but it may also be used for breaking thin ice in order to breathe, and for killing fish. The remains of skates and other flatfish have been found in the stomach of a narwhal, and it is not easy to imagine how a toothless animal, with rather small lips, could capture and swallow such prey unless the formidable tusk were first employed. Cephalopod mollusks, however,

are believed to constitute a principal part of the food. The narwhal is pursued by the Eskimo for food and for the sake of its blubber, with which the whole body is invested to the thickness of about 3 inches, weighing nearly half a ton and yielding a large amount of excellent oil. The tusks are also valuable, as they are denser, harder, and whiter than ivory. The kings of Denmark have long possessed a magnificent throne of this material, preserved in the castle of Rosenberg. Great medicinal virtues were formerly ascribed to the tusks. The animal has been called the sea unicorn.

NA'SAL CATARRH. See RHINITIS.

NASAL DISEASE. See NOSE, *Diseases of.*

NASAL INDEX. See INDEX.

NASALS (Fr., Sp., Portug. *nasal*, It. *nasale*, adapted from ML. *nasalis*, of the nose, Lat. *nasus*, nose). A name applied to consonant sounds, such as *m*, *n*, whose quality is affected by the deflection of the breath from the oral to the nasal passages. The voice is made to pass through the nose by relaxation or dropping of the palatal veil that shuts it off from the pharynx. When the nasal sound is uttered with complete closure of the oral passage, it is called a nasal stop or click or mute, or most frequently a nasal merely, such as English *n*, *m*, or *ng*, uttered in the mouth positions of *d*, *b*, *g* respectively. There may be in a language as many such sounds as there are positions of the mute closure. In Sanskrit, e.g., as many as five kinds of nasals have been noted. In English, French, or German, phoneticians distinguish four classes of these sounds: the *back* or *velar* nasal, of which the place of articulation is the middle of the soft palate, except before the front vowels, when it is farther forward, between the soft and hard palate. It is written *ng* or *nk* in English and German; thus, *finger, think; lange, denken.* While in French it is not recognized as an independent sound, there is a palatal nasal formed farther back than the line between the hard and soft palate which is very similar to it; thus, *régner, Cologne.* This is called the *front* or *palatal* nasal. The stoppage of the *teeth* or *dental* nasal is the same as for *d* or *t* in the three languages mentioned. Thus, English *hint, manner;* German *nein, nennen;* French *neuf, bonne.* In French, however, when final and before a consonant, the *n*, together with the preceding vowel, indicates a nasal vowel, i.e., it is uttered in the same position of the mouth organs as a vowel; thus, *un.* These French nasal vowels, of which four are usually indicated (*an, on, in, un*), are distinguished from similar vowels in other languages by the fact that the velum or soft palate is but slightly relaxed during the emission of the sound. The Portuguese nasals, written *ã, ão, ãe, õe, am, em, im, om, um*, are all produced in the position of vowels. Finally, the *lip* or *labial* nasal is uttered in the bilabial position of *b*, *p* in English, German, and French; thus, English *my, summer;* German *mein, kommen;* French *mon, blâmer.* In French again it may have the value of a nasal vowel, as in *emmener.* All of these nasals may be voiceless, especially before a voiceless sound, as in English *length, sneer, lamp.* Nasal semivowels may also be produced in certain positions. The entire utterance may even be rendered more or less nasal by an habitual dropping of the palatal veil. This is noticeable in certain pronunciations of English in America and Spanish in Spain. It is popularly known as the nasal twang. Consult: Jean Rousselot, *Principes de phonétique expérimentale* (2 vols., Paris, 1901–08); K. A. Viëtor, *Elements of Phonetics, English, French, and German*, translated by Rippmann (London, 1910); Walter Rippmann, *The Sounds of Spoken English* (ib., 1910); Roudet, *Eléments de phonétique générale* (Paris, 1910); P. E. Passy, *Les sons du français* (ib., 1913). See MUTES.

NAS'ARÆ'ANS. According to Epiphanius, a Jewish sect, living in Galaaditis, Basinitis, and the region beyond the Jordan, which existed before Christ and did not know Christ. It has been supposed by some scholars that Epiphanius either himself assumed a distinction between these sectaries and the Nazaræans (q.v.) which in reality did not exist or that he misunderstood a passage in Apollinaris of Laodicea. But there seems to be no convincing reason for thinking of a confusion on the part of Epiphanius. The recent discovery of the Jewish sect of the Covenanters of Damascus (see ZADOKITES) shows that in the same region where the Nasaræans are said to have lived there were dissenting bodies of the kind described. In fact, the emphasis upon the hope of a Messiah from Israel and Aaron, not from Judah and David (see MESSIAH), may have given rise to a Jessæan sect, insisting upon the origin of the Messiah in the branch from the roots of Jesse (Isa. xi. 1), and the Hebrew word for "branch" (*neser*) is likely to have furnished the name Nasaræans. Consult Gustav Hoennicke, *Das Judenchristentum im ersten und zweiten Jahrhunderts* (Berlin, 1908), and Schmidtke, *Neue Untersuchungen zu den judenchristlichen Evangelien* (ib., 1913).

NAS'BY, PETROLEUM V (ESUVIUS). The pseudonym of the American humorist David Ross Locke (q.v.).

NASCAPI, năs'ca-pē, or **NASCAPEE.** The most northeasterly tribe of the Algonquian stock (q.v.), occupying the interior highland region of Quebec and Labrador, northward almost to Ungava Bay. They are closely allied by intermarriage with the Montagnais (q.v.) and trade at the same stations along the St. Lawrence. They depend entirely upon hunting and fishing for subsistence and are still but little changed from their primitive condition. They are supposed to number altogether about 3200 souls. Consult L. M. Turner, in *Bureau of American Ethnology, Eleventh Annual Report* (Washington, 1894).

NAS'CENT STATE (from Lat. *nascens*, pres. p. of *nasci*, to be born), *status nascendi.* The state in which a chemical element exists at the instant of its liberation from a compound. The reacting capacity of an element in the nascent state is far greater than in the ordinary state, i.e., some time after it has been liberated. For example, in the gaseous state hydrogen has no action upon ordinary aldehyde; but when sodium amalgam is brought in contact with an aqueous solution of aldehyde, the latter combines directly with the nascent hydrogen, yielding ordinary alcohol. According to most authors, nascent hydrogen is made up of single atoms, while gaseous hydrogen is made up of molecules, each of which consists of two atoms. Others believe that nascent hydrogen is nothing but highly compressed gaseous hydrogen; for, as a matter of fact, it has been shown that highly compressed hydrogen is capable of acting in many respects like nascent hydrogen, and it can also

be shown that hydrogen is chemically liberated with considerable pressure. Similar remarks apply also to other elements in the nascent state.

NASCIMENTO, näs'sĕ-mān'tô, Francisco Manoel do (1734–1819). A Portuguese poet and a secular priest. Summoned to appear before the Inquisition because of certain heterodox practices, he fled to Holland and then to France, where he spent the rest of his life. While in Portugal, Nascimento formed with some seceders from the Arcadia a counter poetical academy (the Grupo da Ribeira das Naos), whose members observed the Arcadian system of taking pseudonyms, so that he is known as Niceno and Filinto Elysio. At Paris (1817–19) and at Lisbon (22 vols., 1836–40) there appeared two separate editions of his *Obras completas,* neither of which is really complete, but the latter of which is the more useful. Consult: Innocencio da Silva, *Diccionario bibliographico Portuguez,* vols. ii, ix (Lisbon, 1858, 1870); Pereira da Silva, *Filinto Elysio e a sua epoca* (Rio, 1891); Theophilo Braga, *Filinto Elysio* (Oporto, 1891).

NASE'BERRY. See Chewing Gum.

NASEBY, nāz'bĭ. A parish of Northamptonshire, England, 12 miles east by north of Rugby. Pop., under 750. It gives its name to the decisive action of the Civil War between Charles I and the Parliamentary army under Fairfax and Cromwell, which took place here June 14, 1645. The New Model army of the Parliamentarians, numbering about 13,000 men, totally defeated nearly 10,000 Royalists; about 1000 of the latter were killed, and 5000 were taken prisoners; nearly all the Royalist arms and ammunition were also captured.

NASH, Abner (1716–86). An American official, brother of Gen. Francis Nash (q.v.). He was born in Prince Edward Co., Va., but removed to North Carolina, was admitted to the bar, and gained a large practice. He represented Newbern in the First Provincial Congress held in that town in 1774, and the next year was a member of the Provincial Council. He was a member of the body which framed the State constitution in 1776 and was the Speaker of the first House of Commons the next year. In 1780 he was elected the second Governor of the State. His administration was stormy, as the Legislature gave most of his powers to a board of war, and he served but one year. In 1782 and 1785 he represented Jones County in the Legislature and was elected by that body a delegate to the Continental Congress in 1782–84 and 1785–86.

NASH, Charles William (1848–). A Canadian ornithologist, born in the County of Sussex, England, and educated at the Shoreham Grammar School and in the island of Jersey. He went to Canada, studied law, and was admitted to the Manitoba bar (1883), but in 1899 entered the Department of Agriculture, Ontario, and was appointed lecturer on biology by the Farmers' Institute Bureau. Besides serving as associate editor of the *Farming World,* he published: *Birds of the Garden; Wild Fowl of Ontario; Check List Birds of Ontario; Game Fishes of Ontario; Humming Birds of Ontario;* and many other similar works; also *Birds of Ontario in Relation to Agriculture* (1898; 3d ed., 1904).

NASH, Francis (1720–77). An American soldier, born in Prince Edward Co., Va. At an early age he removed to Orange Co., N. C. In 1771 he served as a captain under Governor Tryon in the campaign against the Regulators (q.v.). He was a member of the Assembly in 1771 and from 1773 to 1775. He was also a member of the Provincial Congress of 1775 and by it was commissioned lieutenant colonel of the First North Carolina Regiment in September and promoted to be colonel April 22, 1776. This regiment became a part of the Continental line, and in February, 1777, he was made brigadier general. At Germantown his brigade, which was intended to form part of the reserve, participated in some of the hottest fighting of the day. General Nash was mortally wounded by a cannon ball and was buried at Kulpsville.

NASH, Henry Sylvester (1854–1912). An American Protestant Episcopal theologian, born in Ohio. He graduated from Harvard University in 1878. At the Episcopal Theological School, Cambridge, where he graduated in 1881, he held the chair of literature and interpretation of the New Testament from 1884 to his death. His publications include: *The Genesis of the Social Conscience* (1897); *Ethics and Revelation* (1899); *The History of the Higher Criticism of the New Testament* (1900; new ed., 1906); *The Atoning Life* (1908).

NASH, Sir John (1752–1835). An English architect, born in London. He was a pupil of Sir Robert Taylor. After some years spent in building speculations he began practice in London in 1792 and speedily rose to eminence. He designed numerous mansions, but is chiefly celebrated in connection with the great street improvements in London, especially in the Marylebone region, which he helped to transform into Regent's Park. Regent Street, Haymarket Theatre, Langham Place Church, Park Square, the terraces in Regent's Park, and Buckingham Palace (recently altered) are specimens of his designs. The pavilion at Brighton is another of his works. He died at East Cowes, Isle of Wight, May 13, 1835.

NASH, Joseph (1809–78). An English watercolor painter and lithographer, born at Great Marlow, Buckinghamshire. He studied architecture under the elder Pugin and contributed drawings to the latter's *Paris and its Environs.* He is principally known by his water colors and lithographs illustrating late Gothic domestic architecture and interiors. His publications include *Architecture of the Middle Ages* (1838) and *Mansions of England in the Olden Time* (1839–49; new ed., 1906). His accurate draftsmanship and his knowledge of composition and of the value of light and shade have caused these works to be greatly prized by architects. The figures introduced to illustrate the costumes and habits of the period add greatly to their interest. He also did a series of views of Windsor Castle. There are numerous sketches by him in the South Kensington Museum.

NASH, Richard (1674–1762). An English society leader, better known as Beau Nash, born at Swansea. In 1692 he entered Jesus College, Oxford, but he left before finishing his course and, after a very brief career in the army, entered as a student of law at the Inner Temple in 1693. There he quickly became conspicuous for his good manners, his taste in dress, and his high living. His income being insufficient to meet his demands, he eked it out by gambling and by performing for large wagers such risqué exploits as riding naked through a village on a cow. It was the former occupation that in 1705 took him to Bath, then newly become a fashion-

able watering place. Here was his opportunity. Bath was then a rude little village filled to overflowing with fashionable people who were compelled to pay extravagant rates for miserable lodgings, whose only dancing place was the bowling green, and whose card and tea rooms were canvas tents. Nash set himself to change all this, and in a short time he had succeeded not only in building an assembly house, in procuring decent lodgings, and in reducing the insolent sedan-chair men to humility, but also in making himself the social autocrat of the place. He drew up a set of rules which were enforced on high and low, he practically abolished dueling, and he even assumed the duty of improving the country roads in the neighborhood. During these years his income, principally derived from his partnership in gambling houses and his own skill as a gamester, was large, and he lived in a style befitting "the King of Bath." But in 1740 gambling came under the ban of the law, and, though Nash managed for a time to evade yielding obedience, new regulations in 1745 left him practically without resources. In this plight the town, which owed so much to him, came to his rescue with a pension of £10 a month, and on this he lived until his death. Nash owed but little of his popularity to physical attraction, for, according to Goldsmith, he was large and clumsy, and his features were "harsh, strong, and peculiarly irregular." But he did have "assiduity, flattery, fine clothes, and as much wit as the ladies he addressed." Consult Goldsmith, *Life of Richard Nash* (London, 1762), and Clare Jerrold, *Beaux and the Dandies* (New York, 1910).

NASH, Thomas (1567–1601). An English author, born at Lowestoft, Suffolk, in 1567. He graduated B.A. from St. John's College, Cambridge, in 1586, traveled in France and Italy, settled in London as an author in 1588, and died obscurely in 1601. His first publication was a sharp review of the state of letters, prefixed to Greene's *Menaphon* (1589). It was followed by a pamphlet in similar vein entitled *Anatomie of Absurdities* (1589). Nash now entered the Martin Marprelate controversy (q.v.), writing abusive satires on the Puritans. He also violently attacked Gabriel Harvey in *Have with you to Saffron Walden* (1596). Of more general interest are his satirical sketches of contemporary manners: *Pierce Pennilesse, his Supplication to the Divell* (1592); *The Terrors of the Night* (1594); *Lenten Stuff* (1599); the picaresque novel called *The Unfortunate Traveler, or Jack Wilton* (1594). This last work was the sternest piece of realism that had yet appeared in English fiction. Nash also wrote a comedy entitled *Summer's Last Will and Testament* (printed 1600) and had a hand with Marlowe in *The Tragedy of Queen Dido* (printed 1594). Nash was given to outright speech and sarcastic mirth. He was well read and avowed himself the disciple of Pietro Aretino. He also knew Brant's *Narrenschiff* and the works of Rabelais, a flavor of which is perceptible in him, as well as English poets, such as Surrey and Spenser. Izaak Walton aptly described Nash as "the master of a scoffing, satirical, and merry pen." Consult his *Complete Works*, edited by Grosart (6 vols., London, 1883–85).

NASHUA, năsh'û-à. An important manufacturing city and the county seat of Hillsboro Co., N. H., 40 miles northwest of Boston, Mass., on the Nashua River, near its junction with the Merrimac, and on several divisions of the Boston and Maine Railroad (Map: New Hampshire, G 8). It has a public library, a United States Fish Hatchery, Memorial and St. Joseph's hospitals, the Hunt Home, Nashua Sanitarium, fine courthouse and post-office buildings, and a park system comprising 200 acres. A canal, 3 miles long, 60 feet wide, and 8 feet deep, leading from the Nashua River, furnishes excellent water power for large cotton mills. The manufactures include iron and steel, stationary engines, edge tools, furniture, cotton goods, cards and glazed paper, shoes, refrigerators, ice-cream freezers, registers, sash, doors, and blinds, kits and caskets, overalls, boxes, saddlery and hardware, shears and clippers, etc. Nashua is also the distributing centre for a large agricultural district. A modified form of commission government was adopted in 1914. Pop., 1900, 23,898; 1910, 26,005; 1914 (U. S. est.), 26,901; 1920, 28,379. Settled in 1655, Nashua was incorporated as the township of Dunstable by Massachusetts in 1673, was reincorporated by New Hampshire in 1746, received its present name in 1836, and was chartered as a city in 1853. Consult E. E. Parker, *History of the City of Nashua, N. H.* (Nashua, 1897).

NASHVILLE. The capital of Tennessee, and next to Memphis its largest city, and the county seat of Davidson County, on the Cumberland River (mainly on the left bank), 233 miles east-northeast of Memphis and 186 miles south by west of Louisville, Ky., on the Louisville and Nashville, the Nashville, Chattanooga, and St. Louis, and the Tennessee Central railroads (Map: Tennessee, D 2). It has an area of about 18.2 square miles and is regularly laid out on gradually rising ground, which reaches an elevation of 650 feet above sea level. There are two electric interurban railways. Macadam, bitulithic, and wooden blocks are very largely used in the pavement of streets, about 190 out of a total of 275 miles being laid with these materials. There are a number of handsome structures. The State capitol, situated on a hill, cost $1,500,000 and is the most imposing building in the city. The grounds contain the tomb of James K. Polk and a statue of Andrew Jackson. Among other notable public edifices are the United States government building, the courthouse, the city hall, the Tennessee School for the Blind, the Galloway Memorial Hospital, St. Thomas's Hospital, the State penitentiary, and the Parthenon. The Tennessee Industrial School and the Tennessee Reformatory for Boys are at Nashville, and about 6 miles away is the State lunatic asylum. The Hermitage, of historic interest as the home of Andrew Jackson, is some 10 miles to the east. The national cemetery, a short distance north of the city, has 16,643 graves, 4711 of unknown dead.

Nashville is one of the most prominent educational centres in the South. It is the seat of Vanderbilt University (q.v.); Peabody College for Teachers (q.v.); Knapp School of Farm Life; Meharry Medical College (colored); Walden University (Methodist Episcopal), opened in 1866 (colored); Fisk University (q.v.) (colored); Roger Williams University (Baptist), opened in 1865 (colored); Boscobel College, for women (Baptist), opened in 1889; Ward-Belmont College, for women (Presbyterian), opened in 1865; St. Cecilia Academy, for women, founded in 1860 (Catholic); and Buford Col-

lege for Women, opened in 1900. The State library comprises 40,000 volumes, and Watkins Institute, the repository of the collections of the State Historical Society, has the Howard Library of 10,000 volumes and conducts a large night school. The Carnegie Library consists of 94,000 volumes. Nashville ranks second in the State as an industrial city, its 584 manufacturing establishments in 1915 having an aggregate capital of $41,000,000 and a production valued at $45,000,000. First in importance is the manufacture of flour and grist-mill products, the city being the chief centre of this industry in Tennessee. There are also large printing and publishing houses and extensive manufactories of lumber and planing-mill products, stoves, clothing, tobacco, boots and shoes, fertilizers, etc. Nashville controls a large trade in lumber, cotton, grain, and manufactured goods and, as the distributing centre for a considerable area, has important wholesale interests in groceries, dry goods, drugs, and boots and shoes.

The government, under the charter of 1913, is vested in a commission of five members, who are elected for a term of four years; two are elected at one time, and the other three are chosen two years later. The commission has administrative and legislative powers. This body also selects the members of boards which govern hospitals, charities, and schools, and the tax assessor and city attorney. The judge of the city court is elected by the people. The city's budget cannot exceed the amount of revenue collected during the preceding year. Nashville spent in 1914, in maintenance and operation, about $2,300,000, the principal items of expenditure being $498,091 for education, $277,697 for water works, $172,730 for the police department, $176,476 for the fire department, and $198,000 for interest on the debt. In addition to the ordinary expenses there was expended out of proceeds of sales of bonds and special assessments $705,000 for permanent improvements, new parks, streets, sidewalks, etc. The water works are owned by the municipality, were built in 1832, and rebuilt in 1886. The system now comprises 197 miles of mains. There is a municipal electric-light plant. Pop., 1830, 5566; 1850, 10,165; 1870, 25,865; 1890, 76,168; 1900, 80,865; 1910, 110,364, including 2993 persons of foreign birth and 36,523 negroes; 1914, 114,899; 1920, 118,342.

Nashville was first settled in 1780 by a company of pioneers led by James Robertson and, in honor of Gov. Abner Nash of North Carolina, was called Nashborough until 1784, when it was incorporated as a town under its present name. Throughout its early years the settlement was almost continually harassed by the Indians, and on April 2, 1783, a large body of Cherokees made a determined but unsuccessful attack. Nashville was chartered as a city in 1806, was the seat of the State Legislature in 1812–15 and again from 1826 to 1843, and became the permanent State capital in 1843. It was occupied by a Federal army in 1862 and in 1864 was the scene of a hotly contested battle. (See NASHVILLE, BATTLE OF). Many well-known men, including Andrew Jackson, James K. Polk, Gen. Sam Houston, and Thomas H. Benton, made Nashville their home for the whole or a part of their lives. Consult L. P. Powell (ed.), *Historic Towns of the Southern States* (New York, 1900), and L. P. Elliot, *Early History of Nashville* (Nashville, 1911).

NASHVILLE, BATTLE OF. A battle of the Civil War in America, fought south of Nashville, Tenn., Dec. 15 and 16, 1864, between a Federal army in the command of Gen. George H. Thomas and the Army of Tennessee under Gen. John B. Hood.

When General Hood evacuated Atlanta early in September, he moved west into Alabama, hoping to draw General Sherman after him and carry the war back into Tennessee. General Sherman, however, sent General Thomas and a part of his army to oppose General Hood, while he undertook the March to the Sea. General Thomas proceeded to Nashville and assembled the Fourth Corps of the Army of the Cumberland under General Wood, the Twenty-third Corps, Army of the Ohio, under General Schofield, the First and Third Divisions, Army of the Tennessee, under Gen. A. J. Smith, a provisional division including two brigades of colored troops under Gen. J. B. Steedman, and the cavalry corps under Gen. James H. Wilson, about 55,000 in all. General Hood advancing northward into Tennessee was repulsed at Franklin, November 30, by General Schofield, who at once retired within the intrenchments at Nashville. On December 2 General Hood appeared before Nashville and offered battle. General Thomas, feeling that his army was not sufficiently unified, delayed, though ordered to fight at once by the authorities at Washington. On December 15 he advanced from his intrenchments. The cavalry was placed upon the right of a great curve, the Sixteenth Corps next, the Fourth Corps was the centre and the pivot, the Twenty-third Corps, as a reserve, was to the left, and the Provisional Division was at the extreme left. General Steedman attacked Cheatham's corps on the Confederate right, but was repulsed; but Gen. S. D. Lee in the centre and General Stewart on the left were driven back and some unfinished works captured. Late in the day General Schofield with the Twenty-third Corps was moved to the Federal right. During the night General Hood formed Cheatham's corps on the left. No change was made in the Federal disposition. On the morning of December 16 the Fourth Corps made an unsuccessful attack on Overton's Hill on the Confederate right, but Cleburne's old division was transferred from the left to strengthen the right. General McArthur, of the Sixteenth Corps, assaulted General Bate's division on the Confederate left and pierced the line. At this moment some of Hatch's cavalry, which had made a long detour, attacked the Confederate rear, and soon the retreat became a rout along the whole line. General Forrest with the Confederate cavalry came up and covered the rear. General Hood with the fragments of his army retreated across the Tennessee River, and on Jan. 14, 1865, asked to be relieved from command. The Federal troops actually engaged numbered about 45,000; the Confederate about 25,000. The Federal forces lost in killed, wounded, and missing 3057. The Confederate losses in killed and wounded were not given, but 4462 were taken prisoners. Consult: J. W. De Peyster, *Nashville, the Decisive Battle of the Rebellion* (New York, 1876); Hood, *Advance and Retreat* (New Orleans, 1880); J. D. Cox, *March to the Sea* (New York, 1882); Johnson and Buel (eds.), *Battles and Leaders of the Civil War* (ib., 1887); Steele, *American Campaigns* (Washington, 1909).

NASHVILLE, UNIVERSITY OF. An institution of learning, now out of existence. It

donated its grounds and buildings to Peabody College for Teachers (q.v.).

NASIK, nä'sĭk, or **NASSICK**. The capital of a district of the same name, Bombay, British India, on the Godavari River, 95 miles northeast of Bombay (Map: India, B 5). Owing to its proximity to Trimbak, 19 miles distant, the source of the sacred Godavari, Nasik is one of the holy towns of India, and rivals Benares as a place of pilgrimage. It is the chief seat of Brahmanism in the Deccan, housing 1300 Brahman priests and their families. The town is built on both sides of the river, the portion on the right bank, divided into the old and the new town, being spread over three hills; Panchwati, on the left bank, connected by a bridge, contains the principal features of interest. The river is lined with temples, shrines, and ghats for devotional ablutions. The dwellings are mounted on stone piers and are more than ordinarily substantial. Nasik is the chief seat of the copper and brass industry in the province and is noted for its artistic productions; it has also hand manufactures of cotton and paper. Four and a half miles to the south are the celebrated Lena Caves, situated in a conical hill, about 450 feet from its base. They were excavated probably in the second or third century A.D., and contain several rudely sculptured figures, the leading ones representing Buddha. The town is the Nasica of Ptolemy. It was long the capital of a Mahratta principality. Pop., 1901, 21,490; 1911, 33,463.

NASMYTH, nā'smĭth, JAMES (1808–90). A Scottish engineer and inventor. He was born at Edinburgh, where he received his education at the high school, the school of arts, and the university. As a youth he was an expert mechanic and constructed models of steam engines and other machinery. In 1829 he became assistant to Henry Maudsley, a London engineer, from whom he derived much useful knowledge and experience. In 1834 he began the manufacture of machine tools at Manchester, where his business rapidly increased and developed into the well-known Bridgewater Foundry. In 1839 he invented the steam hammer, which he improved from time to time. He was also the inventor of many important machine tools, including a hydraulic punch and a steam pile driver, and he was the first to propose the use of a submerged chain for towing boats on rivers and canals and of chilled cast-iron shot. In addition to his work as a mechanical engineer he was much interested in astronomy and made many observations with reflecting telescopes which were constructed and mounted according to his ideas. His astronomical work includes investigations of the surface of the sun and moon, which form the subjects of several papers which were published in elaborate form. Consult *James Nasmyth: An Autobiography*, edited by Samuel Smiles (London, 1861–62; new ed., 1895).

NA'SO-PHARYN'GEAL TONSIL. See ADENOID.

NASO'REANS. See MANDÆANS.

NASQA. See NASS.

NASR ED DIN, näsr ĕd dēn' (1831–96). A shah of Persia. On the death of his father, Mohammed Mirza, Oct. 15, 1848, he ascended the throne. At his accession he found the country in confusion, but by the aid of his Vizier, Mirza Taki Khan, he established himself firmly and proceeded to carry out numerous reforms. These plans were unfortunately interrupted by the new Vizier, who was an enemy of all progress. Against the Turkomans and other neighboring peoples Nasr ed Din was successful, but in 1871 the English put a stop to whatever thoughts of further conquest he may have entertained by defining the boundaries between Persia and Afghanistan. The Shah made three tours of Europe—in 1873, 1878, and 1889. This cultured and well-meaning ruler introduced many reforms into his Kingdom, and his long reign of 48 years has but one serious blot on it, the persecution of the Babis. He was assassinated May 1, 1896, and was succeeded by his son, Muzaffar ed Din. Consult: Morgan and Burger, *Nasr ed-Din Schah und das moderne Persien* (Dresden, 1889); James Greenfield, *Die Verfassung des persischen Staates* (Berlin, 1904); A. V. W. Jackson, *Persia Past and Present* (New York, 1906).

NASS, näs (properly NASQA, corruptly NISKA). See CHIMESYAN.

NASSAU, *Ger. pron.* näs'sou. Formerly a German duchy, now a part of the Prussian Province of Hesse-Nassau (q.v.). The districts now known by the name of Nassau were anciently occupied by the Alemanni (q.v.). They subsequently became a part of the Frankish realm. After the partition of the Carolingian Empire in the Treaty of Verdun (843) the present Nassau was a part of the Kingdom of Germany and was included in the Duchy of Franconia. About 1100 the Count of Laurenburg built the castle of Nassau, from which his descendant Walram I took the title of Count of Nassau about 1160. In the middle of the thirteenth century Walram's two grandsons, Walram II and Otho, became the founders of two separate lines, ruling respectively in the southern and the northern parts of the country. The descendants of Walram II continued to rule in Nassau until 1866. His son Adolphus was King of Germany from 1292 to 1298. His later descendants established several separate lines, but by the successive extinction of other branches the Nassau-Weilburg family was left as the sole representative in 1816. In 1806 the territories of the line of Nassau-Usingen had been erected into a duchy. In 1836 Nassau joined the Zollverein. Duke Adolphus of Nassau (1839–66) had many difficulties with his subjects, who chafed under his conservative tendencies. He sided with Austria against Prussia in 1866, with the result that Prussia took possession of Nassau. (See GERMANY.) In 1890 the Grand Duchy of Luxemburg passed to the Duke of Nassau.

The younger line of Nassau was founded by Otho I (died about 1292), who in the division with his brother received the northern part of the country. From this line have sprung the stadholders and royal sovereigns of Holland. This junior branch of the house of Nassau acquired possession in 1544 of the Principality of Orange in the person of William the Silent, the great leader of the Dutch in their struggle for independence, who assumed the title of Prince of Orange. With the death of William III of England and Holland in 1702 Orange passed out of the house of Nassau, but the princely title derived from the little state was retained by his successors, and the reigning dynasty in the Netherlands is still styled the house of Orange. Consult Schliephake and Menzel, *Geschichte von Nassau* (7 vols., Wiesbaden, 1865–89).

NASSAU, näs'są. The capital of the Bahama Islands, situated near the east end of the island

of New Providence (Map: West Indies, C 1). Owing to its salubrious climate, Nassau is a winter resort for invalids, chiefly from the United States. The town is well laid out and has fine public buildings and a cathedral. It has a good harbor, admitting vessels drawing 16 feet. The people are engaged in agriculture and carry on considerable trade in cotton, fruit, sponges, and salt. It is the seat of an Anglican bishop. Pop., 11,000, chiefly negroes. Founded by the English in the seventeenth century, Nassau was destroyed by the French and Spaniards in 1703, but was rebuilt 15 years later. In 1740 it was made a fortified port, open to free trade.

NASSAU, ADOLPH OF. See ADOLPH OF NASSAU.

NASSAU-SIEGEN, näs'ou-zē'gen, JOAN MAURITZ, COUNT and (after 1664) PRINCE VON (1604–79). A Dutch soldier and governor, born at Dillenburg. He early distinguished himself in the service of Holland at the sieges of Breda (1625) and Maastricht (1632). From 1636 to 1642 he was Governor of the Dutch possessions in Brazil. Under his rule the colony was notably prosperous. He defeated the Spanish and Portuguese fleets in 1640, and continued to attack these powers with varying success until his return to Holland (1644). In 1647 he entered the service of Brandenburg, was made Governor of Cleves, and arranged the Treaty of 1661 between Brandenburg and England. Placed at the head of the army of the Netherlands, he defeated the Bishop of Münster (1665). In 1671 he became field marshal, took an active part in the war against Louis XIV in the Spanish Netherlands, and was made Governor of Utrecht (1674). Consult Driesen, *Leben des Fürsten J. Moritz von Nassau-Siegen* (Berlin, 1849).

NASSE, näs'se, CHRISTIAN FRIEDRICH (1778–1851). A German physician, born at Bielefeld. He received his medical education in Berlin and Halle (M.D., 1800) and practiced in his native town. The years 1810 to 1815 he spent in Göttingen, Leipzig, Dresden, and Weimar. He then accepted the chair of practical medicine at the University of Halle and was called to a similar chair at Bonn in 1822. Nasse was a strong representative of the new school of medicine, making science, especially scientific diagnosis instead of philosophical speculation, the basis for therapeutical medicine. Among his many works are: *Leichenöffnungen, etc.* (1821); *Ueber den Begriff und die Methode der Physiologie* (1826); *Handbuch der speciellen Therapie* (1826–38); *Handbuch der allgemeinen Therapie* (1840–45); *Die Behandlung der Gemüthskranken, etc.* (1844); *Vermischte Schriften, etc.* (1850); *Die Untersuchung des Scheintodes vom wirklichen Tode* (1851).

NASSE, ERWIN (1829–90). A German economist, one of the most prominent representatives of the Socialism of the Chair. He was born and educated at Bonn and became professor at Basel, at Rostock, and at Bonn (1860). From 1869 to 1879 he was a member of the Prussian Lower House and in 1889 was appointed to the House of Peers. One of the founders of the Verein für Socialpolitik, he was its president from 1874 until his death. His writings, which were marked by unusual clarity of style, include: *Bemerkungen über das preussische Steuersystem* (1861); *Die preussische Bank* (1866); *Ueber die mittelalterliche Feldgemeinschaft und die Einhegungen des 16. Jahrhunderts in England* (1869; trans. by Ouvry, 1871); "Agrarische Zustände in England," in *Schriften des Vereins für Sozialpolitik*, vol. xxvii (Leipzig, 1884).

NAS'SICK. A town of India. See NASIK.

NAST, THOMAS (1840–1902). An American illustrator, caricaturist, and painter. He was born at Landau, Bavaria, Sept. 27, 1840, but when six years old was brought by his parents to America. After studying a short time with Theodore Kaufman he was given employment, (though only 14 years old) as a draftsman on *Frank Leslie's Illustrated Newspaper*. He went to England in 1860 and then traveled to Italy to follow Garibaldi, making sketches of the war, which appeared in the New York *Illustrated News*, the *Illustrated London News*, and *Le Monde Illustré*. Returning to America, Nast entered the service of *Harper's Weekly*, for which, during many following years, his best work was done. In 1862 his drawings of scenes from the American Civil War, published in Harper's periodicals, attracted wide attention. Pointed and severe and displaying an unusual power of individual characterization, extending even to articles of clothing, Nast's cartoons did much to break up the corrupt Tweed ring and to bring to swift judgment public men who failed to keep faith. Many of the political symbols and types still in vogue, such as the Tammany tiger, the Republican elephant, and the Democratic donkey, were originated by Nast. He started the publication of *Nast's Illustrated Almanac* in 1872, and illustrated *The Tribute Book*, Nasby's *Swingin' 'round the Cirkle*, and among other works, Dickens's *Pickwick Papers* and *Pictures from Italy*. Not only a fine draftsman but a clever painter, remarkable for celerity and facility of execution, Nast is known for pictures that show a sturdy realism and possess a certain richness of color, but evidence lack of technical training. Among his chief oil paintings are: "The Departure of the Seventh Regiment" (1861); "The Civil War"; "Lincoln's Visit to Richmond"; "Head of Christ," Metropolitan Museum, New York. In 1894 he was called to the *Pall Mall Magazine*, London, and in 1902 he became American Consul General at Guayaquil, Ecuador, where he died December 7 of the same year. Consult A. B. Paine, *Thomas Nast: His Period and his Pictures* (New York, 1904), and id., *Life and Letters of Thomas Nast* (ib., 1910).

NAST, WILLIAM (1807–99). An American Methodist Episcopal clergyman, born in Stuttgart, Württemberg, the son of a councilor in the Royal Treasury. He graduated from the University of Tübingen, in the same class with David Friedrich Strauss; came to the United States in 1828; and taught at West Point, Gettysburg, and Kenyon College. In 1835 he entered the Methodist ministry, joining the Ohio conference. He was appointed German missionary at Cincinnati and later at Columbus, founding in the former city (1838) the first German society ever formed in the Methodist Episcopal church. Dr. Nast founded also and edited from 1841 to 1892 *Der christliche Apologete*, the official organ of the German Methodists, later edited by his son Dr. A. J. Nast. The beginnings of the work of the Methodist Episcopal church in Germany may be traced directly to an official visit he made to his native land in 1844. He was a member of a number of General Conferences. Besides translating into German Wesley's *Sermons* and the *Methodist Discipline* and the *Ritual*, he was the author of *The Greek Verb* (1835); *Die Aufgabe*

der christlichen Kirche in neuenzehnten Jahrhundert (1857); *A Commentary on Matthew and Mark*, English and German (1864); *An Introduction to the Gospel Records* (1866); *The Larger Catechism*, English and German (1869); *Die kleiner Katechismus für die deutschen Gemeinden der Bischöflichen Methodisten Kirchen*, English and Swedish (1870).

NASTUR'TIUM. See CRESS; TROPÆOLUM.

NA'SUA. See COATI.

NATA. See NIATA.

NATAL, nā-tăl'. A colony of Great Britain on the southeast coast of Africa, an original province of the Union of South Africa, bounded by the Transvaal Province, Portuguese East Africa, the Indian Ocean, Cape of Good Hope Province, Basutoland, and the Orange Free State Province (Map: Cape of Good Hope, K 7). Its area, including Zululand and the portion of Transvaal annexed in 1902, is 35,290 square miles.

Topography. Natal occupies a part of the seaward slope of the great South African plateau, which falls in a series of terraced escarpments running parallel with the coast around the southern end of the continent from the mouth of the Orange on the west to that of the Limpopo on the east. The ranges culminate in the Drakensberg (q.v.), which forms the natural boundary of the great inland plateau. The average height of the Drakensberg is 9000 feet, and its highest point in Natal, the Montagne aux Sources, has an altitude of 11,155 feet. Below the last ridge of the escarpment is a low coastal plain which widens northward, where it contains a series of large, shallow lagoons, of which the largest is Lake St. Lucia, 55 miles long and 10 miles wide. Natal is watered by numerous permanent rivers of great volume, but, owing to the enormous fall of 8000 to 9000 feet in less than 300 miles, they are all violent mountain torrents falling in a series of cataracts to the sea. The largest is the Tugela.

Climate. The annual precipitation, falling under the influence of the southeast trades blowing over the warm waters of Mozambique Channel, along the coast, is about 44 inches, while in the elevated interior it is much heavier. In regard to temperature Natal presents a series of climatic zones, from the subtropical coastal region with a mean temperature of 68° to the frigid highland region. The former, however, is tempered by cool southeast storms and the latter by the hot winds from the interior.

Flora. The flora is characterized in general by richness and variety, due to the diversity of climates. In the coastal region we find the tropical euphorbias, bamboo, cotton, indigo, sugar cane, coffee, fig, and coconut; in the middle zone the common European cereals, fruits, and vegetables, while higher up are good pasture lands.

Fauna. Nearly all the large wild animals which formerly overran the country have disappeared. Snakes are still found near the coast, including the python, the puff adder, and the venomous cobra.

Minerals. Although coal is the only notable mining product, Natal is reported to be rich in mineral resources. Among the minerals known to occur are asbestos, copper, gold, iron, argentiferous lead, tin, fire clay, graphite, and gypsum. There are extensive coal measures around the head streams of the Tugela. The output of coal in 1911 and 1912 respectively was 2,679,551 tons (valued at £725,448) and 2,765,068 tons (£771,755). The gold output in 1911 was 1706 ounces (valued at £7246) and, in 1912, 1242 ounces (£5276).

Agriculture and Stock Raising. Much of the province is well adapted for either agriculture or grazing. In 1911 there were 481,807 morgen under cultivation (one morgen = 2.11654 acres). The census of that year returned the number of workers on farms at 80,825, including 6944 male and 2352 female whites, 35,958 male and 9541 female South African natives, and 19,618 male and 6412 female persons of other colored races. The leading crop is corn, which constitutes the staple food of the natives. In the year 1910–11 the yield of corn was 1,805,745 muids (of 200 pounds); Kafir corn, 594,132; wheat, 7231; peas and beans, 44,087; and, in muids of 150 pounds, oats, 43,639; sweet potatoes, 285,905; potatoes, 202,641. On the coast and in Zululand there are large sugar and tea plantations. In 1910–11 the production of sugar cane for feed was 36,458 tons; sugar cane for sugar, 1,095,034 tons; sugar, 79,633 tons; molasses, 5,078,600 pounds; rum, 46,733 gallons; tea, 5,007,091 pounds. In 1911 there were 75,567 horses, 15,602 mules, 28,018 asses, 456,087 cattle, 1,519,258 sheep, 989,274 goats, 110,332 swine, and 4111 ostriches. Pastoral production in pounds, according to census returns, for the year ended April 30, 1911: wool, 4,811,315; mohair, 186,178; ostrich feathers, 2573; butter, 1,548,593; cream, 1,068,456; cheese, 15,746; honey, 2149.

Commerce and Communications. A large foreign trade passes through the port of Durban, including transit trade with the Orange Free State and the Transvaal. The chief exports include wool, sugar, hides and skins, tea, coal, corn, and wattle bark. The leading imports are machinery and other iron and steel goods, cotton, and apparel. Since the establishment of the Union separate trade returns have not been made for the provinces, but, as most of the foreign trade passes through Durban, the figures for that port are of interest. Total imports at Durban in 1910 and 1912 respectively, £11,493,136 and £12,021,140; total exports, £4,327,784 and £5,123,478. Of the imports of merchandise to the Union of South Africa in 1912, 30.8 per cent is credited to Durban, and of the exports of merchandise 7.9 per cent. In respect of imports Durban is the first port of South Africa, while in respect of exports Cape Town is far in the lead (76.6 per cent in 1912).

At the end of 1912 there were 5800 miles of main roads. The province has rail communication with the Transvaal and with the Orange Free State and thence with the Cape Province. A Natal line crosses the Cape border into Griqualand East, but does not connect with the Cape system. The railways are of 3 feet, 6 inches gauge. Upon the establishment of the Union the state railways were merged into one system, the South African Railways, under the control of the Union government. The total open mileage of this system at the end of 1912 was 7848, of which 1053 miles, or 13.14 per cent, were in Natal. In addition Natal had 50 miles of private railway. Railway building in Natal began in 1878, when 27 miles were constructed. The mileage increased to 307 in 1890, 570 in 1900, 999 in 1910, and 1053 in 1912. What is known as the Natal Division of the South African Railways comprised 1111 miles

at the end of 1912. The capital cost of this division was £15,283,929 (per open mile, £13,757); earnings in 1912, £2,617,297; working expenses, £1,661,230; excess of earnings, £956,067; interest on capital, £513,988; profit after payment of interest, £442,079. At the end of 1912 the Durban municipal tramways had a length of 19.82 miles and the Pietermaritzburg municipal tramways 8.25 miles. In 1912 there were 249 telegraph offices in Natal, with 2165 miles of line and 6314 miles of wire; telephone wire, 6638 miles.

Government. Natal was annexed to Cape Colony in 1844, but in the following year was placed under separate government. In 1856 it was erected into a separate colony, with partially representative government, and in 1893 responsible government was introduced. Zululand was annexed at the end of 1897, and at the beginning of 1903 the districts of Utrecht Vryheid, Paulpietersburgh, and Ngotshe, formerly belonging to the Transvaal, were annexed. On May 31, 1910, the colony became an original province of the Union of South Africa. The legislative power of the province is vested in the representative Provincial Council (25 members), elected for three years. Its action is subject to the veto of the Governor-General in Council. Executive authority rests with an executive committee, consisting of an administrator, appointed for five years by the Governor-General in Council, and four members elected by the Provincial Council. Of the 130 members of the House of Assembly at Cape Town, 17 represent Natal. Provincial revenue consists of a subsidy voted by the South African Parliament and certain revenues transferred or assigned by the Union government. The seat of the provincial government is Pietermaritzburg.

Education. The 1911 census returned the following degrees of education—persons able to read and write: whites, 43,178 males and 36,877 females; other than whites, 24,203 males and 19,627 females; read only: whites, 518 males and 531 females; other than whites, 4140 males and 3862 females; neither read nor write: whites, 8723 males and 8131 females; other than whites, 483,158 males and 559,950 females. The provincial government controls educational institutions, except those for higher education, which are under the control of the Union government. In 1912 the aggregate number of white pupils in attendance at the government and inspected schools was 16,297, the average daily attendance being 86 per cent. Average daily attendance at government high and preparatory schools was 720. About 1500 pupils attended private unaided schools. White children receiving free education in 1912 numbered 2956. Probably only a small proportion of white children receive no instruction. In 1912 government-aided schools for natives numbered 231, with an enrollment of 17,852; and for Indian children 34, with an enrollment of 3532.

Population. The population at different dates is shown in the table below; the 1901 figures and those for natives in 1891 are estimates.

The figures in the table for 1891 do not include Zululand, and those for 1901 do not include the districts annexed from the Transvaal in 1903. The total for 1904 includes 3774 British troops and their dependents. The natives are classified as Bantus, except 6686 mixed and other colored in 1904 and 9092 in 1911. The Asiatics are almost wholly Indians. The 1911 census (May 7) showed an urban population of 152,988 and a rural population of 1,041,055. Conjugal condition of the white population in 1911: never married, 33,912 males and 26,159 females; married, 17,350 and 16,870; widowed, 1129 and 2508; divorced, 78 and 53; unspecified, 26 and 29. In 1911, of the white inhabitants, Christians numbered 94,432, non-Christians 1492; of the natives (Bantus) 140,965 were Christian and 812,415 had no religion; of the mixed and other colored inhabitants, 10,721 were Christian, 124,989 were non-Christian, and 6599 had no religion. In 1911 Durban with suburbs had 89,998 inhabitants (20,007 white); Pietermaritzburg, 30,555 (14,737); Ladysmith, 5595 (2287).

	1891	1901	1904	1911
Whites....	46,788	63,821	97,109	98,114
Asiatics ...	41,142	74,385	100,918	133,439
Natives ...	455,983	786,912	910,727	962,490
Total ...	543,913	925,118	1,108,754	1,194,043

History. The coast of Natal was first sighted on Christmas Day, 1497, by Vasco da Gama, who named the country in honor of the day (Nativity). The first attempt at settlement made by the Dutch about 1720 proved unsuccessful. In 1824 Captain Farewell and his 20 companions concluded a treaty with Chaka, King of the Amazulus, who had overrun the region during the first decade of the century, but in 1828 the English colony was broken up by Dingaan, the successor of Chaka. In 1835 Captain Gardiner obtained a concession of land from Dingaan and established himself with a number of missionaries at Durban. Two years later the Dutch of Cape Colony, who, in disgust with British rule, had set out in 1835 on their great trek northward, entered the confines of Natal. The first band of pioneers, numbering 79 men under Pieter Maurits Retief, were treacherously murdered by Dingaan, but the tide of Boer immigration continued unchecked, the Zulu power was broken in a great battle on the Bloed River, Dec. 16, 1838, and in 1839 the Republic of Natal was organized, comprising the districts of Pietermaritzburg, Weenen, and Durban. Great Britain, however, continued to regard the Afrikanders as her subjects, and annexed the Republic to Cape Colony in 1843. The greater part of the Boer population trekked westward and northward to found the Orange Free State and the Transvaal. In 1856 Natal was made an independent colony. In 1879 war was carried on against Cetewayo, King of the Zulus; his territory was overrun and occupied; and in 1897 Zululand was annexed to Natal. In 1881 the Transvaal Boers entered the extreme northwestern corner of the colony and defeated the British at Majuba Hill (q.v.). In 1899 and 1900 northern Natal was the scene of fierce fighting between the British and the Boers. At Elandslaagte, Glencoe, and Ladysmith, and all along the line of the Tugela, the most obstinate and sanguinary battles of the war occurred. In 1906 there was a formidable Zulu uprising in the Tugela region. It was suppressed with heavy loss to the natives. In 1909 after a referendum Natal determined to join the Transvaal. In 1910, upon the founding of the Union of South Africa, Natal became one of the original provinces.

Bibliography. W. C. Holden, *History of the Colony of Natal, South Africa* (London, 1855); W. Kermode, *Natal: Its Early History, Rise, Progress, and Future Prospects* (ib., 1882); Henry Brooks, *Natal: A History and Description of the Colony* (ib., 1887); J. F. Ingram, *Natalia: History of Natal and Zululand* (ib., 1897); A. C. Doyle, *The Great Boer War* (ib., 1900); Robinson, *A Lifetime in South Africa* (ib., 1900); Rowell, *Natal and the Boers* (ib., 1900); Russell, *Natal: The Land and its Story* (ib., 1900); Barnett and Sweeney, *Natal: The State and the Citizen* (New York, 1904); Walter Basman, *The Natal Rebellion of 1906* (ib., 1907); H. P. Holt, *Mounted Police of Natal* (London, 1913); also *Statistical Year Book of Natal* (Pietermaritzburg).

NATAL. The capital and chief port of the State of Rio Grande do Norte, Brazil, situated on the right bank of the Potengy River, near the Atlantic, 140 miles north of Pernambuco (Map: Brazil, K 5). The estuary which forms the harbor is obstructed by sand bars, but extensive dredging has opened the port to vessels drawing 22 feet. The port is the chief outlet for the products of the state, and it exports cotton, leather, rubber, woods, and sugar. It is the seat of a United States consular agent. Pop. (est.), 20,000.

NATAL GRASS (*Tricholæna rosea*). A South African perennial grass of rapid growth, attaining a height of 1 to 3 feet, according to soil and moisture conditions. It has been extensively introduced into many of the warmer portions of the globe, and in most places it is highly appreciated as a hay and pasture grass. It is probably best adapted to use as a hay grass as it cures readily and three to five cuttings per season are reported. In India it thrives best at medium to high elevations. In Australia immense yields are reported when grown in river bottoms. In Hawaii it has some value as a pasture grass at medium elevations, but it is considered better as hay. In Florida three cuttings per season have been secured, and it is considered a valuable addition to the forage crops in that State. As hay it is little inferior to timothy, as shown by analysis. Another species, *Tricholæna teneriffæ*, is called red Natal grass in Australia.

NATALIE, nä'tä'lē' (1859–). A queen of Servia, the daughter of a Russian officer named Keshko. In 1875 she married Prince Milan, afterward King of Servia, but their married life was unhappy, and in 1888 Milan procured a divorce. After King Milan's abdication in 1889 she returned to Belgrade and remained for some time with her son, King Alexander; but the National Assembly having requested her to leave the country in the interest of internal harmony, she withdrew in 1891, though with the masses of the people she enjoyed immense popularity, owing partly to her beauty. In 1893 she became reconciled to King Milan. In the following year she was restored by royal decree to all her rights as a member of the royal family, and in 1895 she returned to Belgrade and was received with great enthusiasm. But she made Biarritz, France, her residence, and indeed, after the assassination of Alexander in 1903, she was forbidden to enter Servia. In 1902 she joined the Roman Catholic church.

NATAL SORE. See Boil.

NA'TANT. A term in heraldry. See Naiant.

NATCHEZ, năch'ĕz (from their native name, *Na'chi*). An interesting tribe, of Muskhogean stock, originally residing in nine villages in the vicinity of the present city of Natchez, Miss., with a total population of perhaps 2500. Although comparatively a small tribe, they exercised a commanding influence from the Gulf to the Ohio. Their greatest religious rites were connected with the worship of the sun. They were sedentary and agricultural, expert basket weavers and skillful potters, while their men bore a deserved reputation as proud and determined warriors. In 1716 they quarreled with the French, who had without their consent erected Fort Rosalie in their country. In 1722 a fight occurred at the post, in which several were killed on both sides. Other collisions followed, until the Natchez secretly organized a combination of several neighboring tribes to drive out the white intruders. On Nov. 28, 1729, the Natchez fell upon the garrison and massacred 200 men, only 20 escaping, besides making prisoners of all the women, children, and negro slaves. The war rapidly spread to the outlying settlements, but after a few weeks the Natchez, unable to oppose the French and their Indian allies, fled across the Mississippi and fortified themselves in stockade forts on Black River, La. Here they were attacked in January, 1731, by a strong French force, which succeeded in taking nearly 450 prisoners, the rest escaping during a storm at night. All the prisoners were sold as slaves in the West Indies. The remnant, made desperate by defeat, continued the war, but were obliged to give way before fresh Spanish reënforcements from the west. This ended the war, in which they had probably lost half their tribal population. The survivors took refuge with other tribes, some with the Chickasaw, others with the Creek and Cherokee. A part of them, under the name of Notchee, even found their way to South Carolina and were incorporated with the Catawba. Consult J. R. Swanton, *Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico* (Washington, 1911).

NATCHEZ. A city and the county seat of Adams Co., Miss., 98 miles southwest of Jackson, on the Mississippi River and on the Yazoo and Mississippi Valley, the Mississippi Central, the Natchez and Southern, and the St. Louis, Iron Mountain, and Southern railroads (Map: Mississippi, C 7). It is built largely on a bluff, 200 feet above the river, the summit of which contains the most costly residences, and the base, or water front, is devoted to shipping. Among noteworthy features of the city are the fine Memorial Park, Fisk Library, Agnes Z. Carpenter Public Library, Jefferson Military College, Natchez Institute, Institute Hall, Elks and Prentiss Club buildings, Natchez Hotel, and the handsome courthouse and ante-bellum city hall buildings. A national cemetery on a bluff adjoining the city contains 3159 graves, 2780 of unknown dead. In it is an observatory commanding fine views. Natchez has steamboat connection with the whole Mississippi valley and is the shipping port of a large cotton region, exporting annually many thousand bales. There are cotton mills, a cotton compress, cottonseed-oil mills, a foundry, saw and planing mills, an artificial ice plant, etc. The government is administered under a charter of 1877, which provides for a mayor, chosen biennially, and a unicameral council that elects the school trus-

tees. The water works are owned by the city. Pop., 1900, 12,210; 1910, 11,791; 1920, 12,608.

In 1716 Bienville built Fort Rosalie on Natchez Bluff. In October, 1729, the place was destroyed, and most of its inhabitants were massacred by the Natchez Indians. In 1763, according to the terms of the Treaty of Paris, the English took possession and renamed the fort Fort Parmure. From this year dates the real foundation of the village. A Spanish force from New Orleans dispossessed the English in 1779, and in 1798 Spain gave way to the United States. Natchez was incorporated as a city in 1803. It was the capital of the Natchez District and Mississippi Territory to 1802. It suffered considerable damage from a tornado in 1840. The city was shelled by Commodore Porter in 1862, and in 1863, soon after the fall of Vicksburg, it was occupied by Federal troops and remained under their control until the close of the war.

NATCHEZ, nȧ'chȧ', Les. A romance written by Chateaubriand during his exile in England and printed in 1825–26.

NATCHEZ TRACE. A famous highway which traversed the present State of Mississippi. It was made possible by treaties entered into in 1801 between the United States on the one hand and the Chickasaws and Choctaws on the other. The road from the national boundary to Natchez was laid out in 1802. Appropriations were made by successive Congresses for the road. The Natchez Trace, after crossing the Tennessee River a few miles below the Mussel Shoals, at Colbert's Ferry, pursued a southwesterly course through the country of the Chickasaws and Choctaws to the Grindstone Ford on the Bayou Pierre, thence ran south and west to Natchez. South of Natchez it followed the general trend of the river to the line of demarcation and eventually connected with the various roads leading to New Orleans. At Nashville, Tenn., this old road connected with the public highway which ran east to Pittsburgh, Pa. The total distance from Natchez to Nashville was 501 miles, and the distance to Pittsburgh was 1013 miles. Numerous stations sprang up along the road between Natchez and Nashville. Under the auspices of the Daughters of the American Revolution granite bowlders have been erected marking the site of this famous old highway.

NATCHITOCHES, năk'ĭ-tŏsh'. An extinct tribe of the Caddoan linguistic family of Indians, living formerly on the Red River in Louisiana. Their habit of life was partly hunting, partly agricultural. They dwelt in permanent houses covered with sod. Their religion demanded under certain conditions the sacrifice of human beings. See Caddoan Stock.

NATCHITOCHES, năk'ĭ-tŏsh' *or* năk'ĭ-tŏsh'. A town and the parish seat of Natchitoches Parish, La., 72 miles by rail southeast of Shreveport, on the Cane River and on the Texas and Pacific and the Louisiana and Northwestern railroads (Map: Louisiana, C 3). It is the see of a Roman Catholic bishop and has a State normal school, a high school, and St. Mary's Academy (Roman Catholic). The town is surrounded by a productive district devoted to stock raising and agriculture, its chief products being cotton and sugar cane. Natchitoches owes its origin to a trading post, established in 1714 by the French, and is the oldest town in the State. The water works and electric-light plant are owned by the municipality. The commission form of government has been adopted. Pop., 1910, 2532.

NA'THAN, Maud (1862–). An American economist, born in New York City, a sister of Annie Nathan Meyer (q.v.) and the wife of Frederick Nathan, to whom she was married in 1880. She made addresses before the International Congresses of Women at London in 1899 and Berlin in 1904, the International Peace Congress at New York in 1907, and the International Conference of Consumers' Leagues at Geneva in 1908. In 1897 she became president of the Consumers' League of New York. She served also as vice president of the National Consumers' League, of the Equal Suffrage League of New York, and of the Equal Franchise League. Mrs. Nathan became known as a magazine writer and as a public speaker, and in 1912 she campaigned for the Progressive party.

NATHAN'AEL (Gk. Ναθαναήλ, transliteration of Heb. *Nethan'ēl*, God gives). One of Jesus' first disciples. He was of Cana of Galilee and, therefore, a neighbor of Philip, who was of Bethsaida. Both may have been disciples of the Baptist. He is mentioned in two passages in the Fourth Gospel (i. 45–51; xxi. 2). In the former passage, after Jesus had called Philip to his following, Philip finds Nathanael and announces that in Jesus of Nazareth had been discovered the one "of whom Moses in the law, and the prophets wrote"—in other words, the Messiah. Nathanael questions so great a religious product from so insignificant and possibly ill reputed a place ("Can any good thing come out of Nazareth?"), but is willing to accept Philip's invitation to make the test of personal acquaintance. Because of this open-mindedness he is greeted by Jesus as "an Israelite indeed in whom is no guile." His question at Jesus' estimate of his character ("Whence knowest thou me?") is not lacking in modesty; it is merely a naïve surprise at Jesus' knowledge of character in advance of knowledge of person and, upon Jesus' reply ("Before Philip called thee, when thou wast under the fig tree, I saw thee"), brings him at once to an acknowledgment of Jesus' Messiahship ("Rabbi, thou art the Son of God; thou art the King of Israel"). In the latter passage he is one of the group of seven to whom Jesus appeared at the Sea of Galilee after the resurrection. For the possible identification of Nathanael with the Bartholomew of the Apostle list, see Bartholomew.

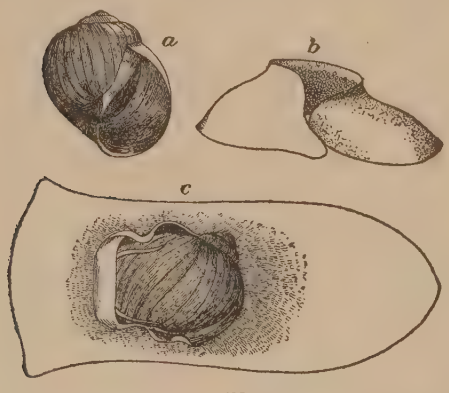
NATHAN DER WEISE, nä'tän dĕr vī'ze. A dramatic poem by Lessing, published in 1779, in which the author clothed in poetic form the principles underlying his controversial writings. The drama is based upon the story of *Melchisedec the Jew*, in Boccaccio's *Décamerone*. The character of Nathan is a monument to Lessing's friend Moses Mendelssohn, the Jewish philosopher.

NATHORST, nät'hôrst, Alfred Gabriel (1850–). A Swedish scientist, distinguished for his Arctic researches and expeditions. In 1870 and 1882 he served in scientific expeditions to Spitzbergen. In 1883 he was one of the scientific staff of Baron Nordenskiöld's (q.v.) expedition to Greenland. Leading an expedition in 1898, Nathorst circumnavigated Spitzbergen and visited and explored both the Wyches Islands (King Charles Islands) and Gillis Land (q.v.). He led in 1899 a geological expedition to east Greenland, where he discov-

ered King Oscar Fiord. In 1884 he became director of a section of the Riks-Museum, Stockholm. He was highly honored not only by the scientific societies of Sweden, but also by the universities of Cambridge and Greifswald and by societies of Berlin, Belgium, Vienna, etc. A voluminous and standard writer on Polar subjects in their relation to geology, geography, zoölogy, and especially to paleobotany, Nathorst published altogether more than 300 papers, essays, and books. A memoir on fossil floras of the Arctic region was issued by the Smithsonian Institution. His most important geographical work is *Två somrar i Norra Ishafvet* (2 vols., 1901). *Zur fossilen Flora der Polarländer* (2 vols., 1894–1915) is also especially significant in its field. For scattered memoirs, consult Hulth, *Swedish Arctic and Antarctic Explorations* (Upsala, 1910).

NATHUBHOY, nät'ụ-boi, Sir Mangaldas (1832–90). An East Indian merchant and reformer. He studied English, succeeded to his grandfather's fortune in 1843, and became the head of the Kapol Bania caste. In 1866–74 he was a member of the Legislative Council of India. Interested in social and educational reform, he established a dispensary at Kalyan in memory of his wife and a female ward in the David Sassoon Hospital at Poona and founded eight traveling fellowships in Bombay University. His benefactions amounted to nearly $2,500,000. He was knighted in 1875.

NATICA (Neo-Lat., from Lat. *natis,* buttock). A genus of gastropod mollusks, represented by *Natica heros* (now *Polynices heros*), one of the most common and largest of the univalves and to be found in abundance along the Atlantic coast from New Jersey to Maine. The shell is large, composed of several whorls, with a small flattened spire or apex. The aperture is large, lunate in shape, and can be closed by a large horny door or operculum.



WHITE SNAIL (*Natica heros*).

a, the shell; *b*, an egg case; *c*, animal, with distended foot, in the attitude of walking.

The animal lives partly buried in the sand, near low-water mark. On taking it up the large, round, swollen foot or creeping disk ejects a spray of water as if poured from the rose of a watering pot. The animal has two short, broad, flattened tentacles, but, owing to its burrowing habits, its eyes are wanting. Its eggs are laid in a large, thin circular mass, like a miniature lamp shade, which is a curious object and a good deal of a puzzle to young collectors. Another common but much smaller snail (*Polynices triseriata*) is thought to be the young of this species. It is marked with three rows of bluish or chestnut-brown spots. A rather more southern species is *Polynices duplicata,* in which the umbilicus (open in the other species) is closed or nearly so. See Gastropoda. Consult A. F. Arnold, *The Sea Beach at Ebb-Tide* (New York, 1901), and A. G. Mayer, *Sea-Shore Life* (ib., 1905).

NATICK, nā'tĭk. A town, including several villages, in Middlesex Co., Mass., 17 miles west-southwest of Boston, on the Charles River and on the Boston and Albany Railroad (Map: Massachusetts, E 3). It has public parks, one containing a soldiers' monument, another a bathing beach, and still another a monument to the memory of John Eliot; the head of Cochituate Lake, one of the sources of Boston's water supply; the Walnut Hill School, for young ladies; the Morse Institute (public library and reading room); the Morse Hospital; and the Bacon Public Library. Another place of interest is the shoe shop where Henry Wilson, afterward Vice President, worked as a cobbler. The principal industries are the manufacture of boots, shoes, shirts, clothing, baseballs, boxes, saws, etc. The government is administered by town meetings. There are municipal water works. Pop., 1900, 9488; 1910, 9866; 1914, 10,026; 1920, 10,907. Natick was founded by John Eliot, who about 1651 brought hither from Nonantum a company of "praying Indians," and for many years it was almost exclusively a settlement of Indian converts. Near the centre of the town is their old burial place. Natick was incorporated in 1781. Consult: O. N. Bacon, *History of Natick* (Boston, 1856); S. A. Drake (ed.), *History of Middlesex County,* vol. ii (ib., 1880); Hurd, *History of Middlesex County, Mass.* (Philadelphia, 1890); W. W. Tooker, "Significance of John Eliot's Natick," in *American Anthropologist,* vol. x (Washington, 1897).

NATIONAL ACADEMY OF DESIGN, The. A society of American painters and sculptors, with headquarters in New York City. The first Academy of Arts in New York was founded in 1802 by prominent citizens, among whom was only one professional artist, Trumbull, but it excited little interest until 1825, when a secession of the younger artists occurred. Dissatisfied with the character of the old society, they formed a new association, called the New York Drawing Association, directed by practical artists. The present name was adopted in 1828, and the society, composed of 30 members, was incorporated. Prof. S. F. B. Morse (q.v.) was the chief organizer of the movement and was twice president of the National Academy, in 1827–45 and again in 1861–62. Other presidents who did much to shape the Academy's policies were Daniel Huntington (1862–70), Frederick Dielman (1899–1909), John W. Alexander (1909–15). J. Alden Weir was elected president in 1915, Mr. Alexander having declined to accept renomination. The election was considered an indication that the more liberal and younger element in the Academy were in the ascendant. The home of the society, the Fine Arts building on Fifty-seventh Street, proved inadequate for representative exhibitions, but the city refused to grant space in Central Park for a new structure, and no other plan had been settled on up to 1915.

The society is governed by a council consisting of its officers and six members, and the instructors in the school of design are chosen from among its ranks. The Academy stood for the conservative, traditional element in art, as opposed to the more modern tendencies which were represented in the earlier work of the Society of American Artists (q.v.); but since the union of the two institutions (see below) it has sought to include in its membership all art tendencies except what it deemed the ultra-radical. It held its eighty-first annual exhibition in 1906. At these exhibitions the Clarke prize of $300 and the Hallgarten prizes of $300, $200, and $100 respectively are distributed, and the Inness gold medal for the best landscape. On July 1, 1906, the National Academy was affiliated with Columbia University and the Metropolitan Museum of Art. In 1906 the Society of American Artists was merged into the Academy, all of its members not already Academicians becoming associates. The number of Academicians, hitherto limited to 100, was increased to 125 painters, 25 sculptors, and 25 architects and engravers. The school of design connected with the Academy has been in existence since 1825, and the instruction includes classes in the antique, life, still life, anatomy, painting, perspective, composition, etching, and medal and coin engraving. These classes are open from October until May and are free to students admitted on the evidence of the school committee. The average attendance of pupils is from 200 to 300. Consult T. S. Cummings, *Historic Annals of the National Academy of Design* (Philadelphia, 1865), and also *Catalogues of the Annual Exhibitions* (New York, 1826 et seq.).

NATIONAL ACADEMY OF SCIENCES. A society incorporated in 1863 for the purpose of examining and investigating any subject of science or art and for making the reports of special investigations at the call of the United States government, which makes appropriations for the expenses of special examinations and reports. The Academy consists of honorary members and foreign associates. Members must be citizens of the United States. One special meeting is held in each year in Washington, beginning with the third Monday in April, and another, called the autumn meeting, may be held at such time and place as the council of the Academy may determine. Special scientific meetings may be held at times and places designated by the council. In 1914 there was inaugurated a series of lectures called the William Ellery Hale lectures. These were established through a foundation offered by the children of William Ellery Hale, which provides for a course of two or three lectures at each semi-annual meeting of the Academy, to be delivered by some scientist of distinction. In the same year was also made the initial award of the Medal for Eminence in the Application of Science to the Public Welfare; this was established through a fund provided by Mrs. Helen Hartley Jenkins in memory of her father, Marcellus Hartley. The medal was awarded to Gen. George Goethals and to W. C. Gorgas for distinguished service in engineering and sanitation respectively in building the Panama Canal. The Academy has conducted or taken part in many important investigations. In 1914, at the request of President Wilson, a member was appointed to serve as one of a special commission to visit the Pribilof Islands for the purpose of advising the government regarding the condition of the fur-seal herd and to make the recommendations concerning the policy which should be adopted with reference thereto. The committee has several funds from which appropriations are made to carry on researches in science. The standing committees of the Academy are: mathematics; astronomy; physics and engineering; chemistry; geology and paleontology; botany; zoölogy and animal morphology; physiology and pathology; anthropology and psychology; weights, measures, and coinage; solar research; publication; finance; and the committee on collection of historical portraits, manuscripts, instruments, and so forth. In addition to the medal awarded above, the Academy presents also every five years the Barnard Medal for Meritorious Service to Science. The Academy has about 140 members and about 45 foreign associates. The president in 1915 was William H. Welch. The *Proceedings* of the meetings are published annually.

NATIONAL ARMS. Heraldic devices typifying national sovereignty whose use has received official sanction. National arms originally were in large part derived from the personal emblems of the ruler and thus gradually came to represent governmental authority, though with changes in forms of government and especially with the rise of democracy these emblems often lost their original significance. In some cases where monarchical government has been supplanted by a republican form there has been a corresponding change in the national arms, as instanced in the case of Portugal in 1910; while in such a democracy as the United States national arms have been sanctioned and adopted without the slightest reference to any emblem of an individual or group of individuals. Likewise in Great Britain, where the arms have resulted from the heraldic devices of individual sovereigns, to-day they are symbolic of governmental rather than personal authority. While the insignia of saints and martyrs usually appear in the heraldic blazonments of nations according to the laws of heraldry, which as is well known dates from the Crusades, yet among the national emblems and symbols there are often found forms of crosses and stars, swastikas, and other devices plainly of prehistoric origin. The reader is referred to the article HERALDRY, especially the section where is discussed the application of its laws and principles to national coats of arms.

NORTH AMERICA

United States. The national emblem consists of arms and crest, the arms being an American eagle displayed proper, bearing on his breast a shield having 13 pales, alternately silver (white) and red. There are seven white pales, thus making a white one come in the centre and making the edges white, the reverse of the order on the national ensign. (See FLAG.) The shield has a chief of blue, i.e., an upper horizontal portion, but on this chief there are no stars. The sinister talon of the eagle holds 13 arrows, proper; the dexter claw grasps an olive branch, proper. The olive branch has 13 leaves and 13 berries, though this number is not specifically prescribed by law. The motto on a ribbon held in the eagle's beak is *E pluribus unum*, meaning "One out of many," and has reference to the formation of one nation by the union of the States.

The crest is over the eagle's head and is a circular golden glory breaking through, and so surrounded by, a white cloud. On the glory are 13 five-pointed stars, described in heraldic language as mullets. These are on a blue ground. The stars are silver (white) and represented a new constellation in the political firmament. On the reverse of the 50-cent coin, where the arms are shown approximately correct, the 13 stars over the eagle's head are without the glory, and the olive branch has no berries.

EUROPE

Austria-Hungary. The arms of the dual monarchy are a black double-headed eagle. The heads are crowned, and the double head indicates the former Holy Roman Empire. Above and between the eagle's heads is the Imperial crown of Austria. The dexter claw of the eagle holds a sword and sceptre and the sinister claw an orb, and on the breast is shown a shield divided equally into three vertical portions—(1) Hapsburg, a golden ground with a rampant lion in red; (2) Austria, a silver fess on a red ground; (3) Loraine, a red bend bearing three eaglets in silver, all on a golden ground. The shield is surrounded by the collars of the Order of the Golden Fleece and of Maria Theresa. On the wings of the eagle are the arms of the 11 provinces, each small shield ensigned with a crown. The provinces represented are, on the dexter wing: (1) Hungary ancient impaling Hungary modern. This is four silver bars on a red ground, said to refer to the four great rivers of Austria, the Danube, the Save, the Drave, and the Theiss. On a red field a triple mount green, with a patriarchal cross silver issuing from a crown gold, for Austria modern. The mountains are supposed to represent the three highest peaks in the Carpathians. (2) Esclavonia; (3) Austria above the Enns impaling Austria below the Enns; (4) Salsburg; (5) Styria; (6) Tirol. At the top of the sinister wing is (7) Bohemia; (8) Illyria; (9) Esclavonia; (10) Moravia impaling Silesia; (11) Carinthia impaling Carniola.

Belgium. The royal arms of Belgium are a golden lion on a black ground; its tongue and claws are red. The shield is ensigned with the royal crown of Belgium, and the supporters are two golden lions. The motto of Belgium is *L'Union fait la force* (Union makes strength). This coat of arms is borne on the central yellow portion of the royal standard, a flag composed of equal vertical stripes of black, yellow, and red.

Bulgaria. A crowned golden lion, salient, bearing a shield with a blue diapered bend dexter on a ground of five bars black on gold.

Denmark. The arms of Denmark are quartered by the Dannebrog. (See NATIONAL FLAGS.) The first quarter represents Denmark and is three blue lions crowned on a golden ground, powdered with red hearts. The second quarter is for Schleswig, two blue lions on a golden ground. The third quarter shows modern Sweden, three open golden crowns on a blue ground; Iceland, a silver hawk on a red ground; the Faro Islands, a silver goat, walking, on a blue ground; Greenland, a rampant silver polar bear on a blue ground. The fourth quarter shows Jutland, a blue lion at the top, on a golden ground, and ten red hearts below; Vandalia, a golden dragon on a red ground. On a secondary shield or inner escutcheon appear the arms of (1) Holstein; (2) Stormerk; (3) Dietarchen or Ditzmers; (4) Lauenburg. On a third shield, hanging in front, or on the centre of the others, Oldenburg impales Delmenhurst. The supporters are two savage men wearing green wreaths and each holding a wooden club. The royal standard is red, with a white cross. The flag is swallow-tailed, and at the space where the cross's arms intersect there is a square of white containing the royal arms.

France. The arms of Republican France are neither official nor an heraldic device. The official seal adopted in 1870 represents a seated figure of France bearing the fasces. It is a more or less conventional representation of the goddess of liberty, with a sheaf of grain, typifying fruitfulness, at her feet, the lamp of truth or reason, and other symbols. The head is decorated by rays. The tricolor or national flag is used exclusively for patriotic display, though a decorative emblem with letters R F was authorized in 1896, while a shield with the national colors and bearing the letters R F and the axe and fasces is frequently employed.

Germany. The Imperial arms of Germany consist of a black eagle displayed, with red claws and beak, bearing upon his breast the arms of Prussia, a golden shield with a black, displayed eagle holding in his dexter talon a sceptre and in his sinister one an orb. On the breast of the Prussian eagle is a small shield quartered black and white, the colors of the Hohenzollerns.

Great Britain. The arms of Great Britain are the personal arms of the King. William the Conqueror bore two golden lions, or leopards, on red, said to represent Normandy and Maine, and when Henry II married Eleanor of Aquitaine he added a lion to represent his sovereignty over that province. These now appear in the first quarter. The lion rampant of Scotland, red on a golden ground, is surrounded by the double tressure, flory counterflory, also red, and appear in the second quarter. The origin of the tressure is uncertain; it probably refers to an *entente* with France. It is shown on the seal of Alexander III (1249). The Irish harp, gold with silver strings on a blue ground, appeared in the royal arms (third quarter) in the reign of James I (1603). Blue is the color for Ireland, not green, as is so often incorrectly used on bunting. The fourth quarter repeats the first, according to heraldic rules. The shield is surrounded by the garter of the Knights of the Garter, and it is quite proper to show the collar of the order as well. The supporters are, dexter, a crowned lion rampant gold for England and, sinister, a silver unicorn rampant with gold collar and chain for Scotland. The motto is *Dieu et mon droit* (God and my right), with the rose, shamrock, and thistle placed about the ribbon. The crest is a crowned lion standing on the crown, upon a helmet placed afronté, with five bars across the face. The royal standard, which is the King's personal flag, hoisted on shipboard or on a building only when the King himself is present, displays merely the arms without crest, supporters, or mottoes and is practically the royal escutcheon in bunting. The arms of the Prince of Wales are the same as the King's, except that they are differenced by a silver label of three points and contain the

crowned arms of the Principality of Wales displayed on a shield of pretense in the centre. The supporters are also differenced by a label.

Greece. A blue shield bearing a silver cross and surmounted by the crown is the arms of Greece. The supporters are two savage men with clubs, standing above the motto. See NATIONAL FLAGS.

Holland. Upon a blue ground dotted with golden billets there is a crowned golden lion rampant, grasping in one paw a naked sword and in the other a sheaf of arrows. The shield is crowned, and the supporters are two crowned lions rampant. The motto on a scroll underneath is *Je maintiendrai* (I will maintain).

Italy. The royal arms of Italy are a crowned black eagle displayed on blue. On the breast is a cartouche, or oval shield, with a white or silver cross on a red ground. The shield is surrounded by the collar of the Annunciation, with its pendant representing that event. The collar is composed of a series of red and white roses and the letters R T F E joined together. In the collar the letters are thus arranged. The meaning is uncertain, but, as they appear in the collar, the reference is probably to the sentence, *Rhodum tenuit fortitudo ejus* (His firmness held Rhodes), referring to the assistance given by Amadeus the Great to the Knights of St. John of Jerusalem in 1310 at the siege of Rhodes by the Saracens. See NATIONAL FLAGS.

Monaco. This small principality has a canopy "of the colors," i.e., like the shield. This is heraldically described as fusily silver and red. The canopy is crowned and is also covered with diamond-shaped figures, white and red, as described. The supporters are two monks with swords. The collar of the Order of St. Charles surrounds the shield. The motto placed over the shield is *Deo juvante* (God helping).

Montenegro. Red, a double-headed eagle, displayed silver, over which is the royal crown. The bird holds sceptre and orb; a small shield on the breast contains the letters H I, and underneath the eagle is a golden lion. The initial, though like an "H," is really Montenegrin "N"—referring to Nicholas, the King. "I" is the Roman numeral.

Norway. A red, crowned shield, in which is a golden lion rampant holding a battle-axe.

Portugal. The arms of Portugal consist of an armillary sphere upon which is placed a silver shield bearing five small escutcheons of blue with five plates or disks of silver in each. The large shield has a red border on which are seven golden castles. See NATIONAL FLAGS.

Rumania. Within a canopy of ermine is a crowned quartered shield: (1) a golden eagle displayed on blue; (2) a lion's head, gold on red; (3) a golden demilion issuing from an antique crown, on red; (4) two dolphins, gold on blue. A small shield of pretense is quartered white and black.

Russia. The Imperial arms of Russia are the black double-headed eagle. On the breast of the eagle is a red shield showing in natural colors St. George slaying the dragon. Surrounding the shield are the collar and pendant of St. Andrew. The heads of the eagle are crowned, and above and between them is the crown of Russia. The talons hold orb and sceptre. The Imperial eagle on the standard has no sceptre and orb, these being replaced by two maps, one of the Caspian Sea in the dexter claw and the Black Sea in the sinister. The beaks hold two maps, the dexter beak showing the Baltic Sea and the sinister the White Sea. On the displayed wings of the eagle are eight small shields representing the provinces of Russia. They are not crowned, but stand for—(1) Kazan, a black dragon; (2) Poland, a silver eagle, displayed; (3) Taurida, an eagle, displayed, with a shield on its breast bearing a triple cross; (4) this escutcheon is divided into three and looks like a division of a window with two curtains drawn aside at the bottom and the blind or shade showing in the exposed space between: (*a*) Kiev, the figure of St. Michael, (*b*) Novgorod, a throne in front of which are two black bears on a golden ground and two fish in base, (*c*) Vladimir, a red lion rampant with golden crown; at the top of the sinister wing are (5) Astrakhan, a royal crown and scimitar; (6) Siberia, two martins on an ermine ground; (7) this shield is quartered: (*a*) Kabarda, arrows and stars, (*b*) Iberia, a leaping horse, (*c*) Kartalinia, a volcano, (*d*) Armenia, a red lion rampant, (*e*) Circassia is shown by the curtain-and-window arrangement—a warrior, and (*f*) Georgia—St. George and the dragon is placed on a shield of pretense; (8) is Finland, a lion rampant with sword and scabbard.

Servia. A crowned red shield within a crowned ermine canopy. On the shield is a silver eagle displayed bearing upon its breast a red shield with silver cross and the date 1804. Between each two of the arms of the cross is a Slav initial letter. The supporters are two natives holding flags of the colors, and the motto is *Spes mihi prima Deus* (My hope is God, first of all). The motto is not now used.

Spain. The arms of Spain are within an ermine-crowned canopy. They consist of a quartered shield representing 1 and 4, Castile, and 2 and 3 Leôn; a golden castle on a red ground for Castile and a red lion rampant on a silver field for Leôn. The shield is encircled by the collar of the Golden Fleece. In the lower portion, between the vertical division, or *enté en point*, there is on silver a pomegranate proper, for Granada. Over all a cartouche of France (modern), three golden fleurs-de-lis on a blue field.

Sweden. An ermine canopy on which appears a crowned shield of blue quartered by the gold Dannebrog. The quarters are: 1 and 4, three open golden crowns for Sweden; 2 and 3, a golden lion rampant on three silver bends, wavy, sinister, for Gothland. On a small shield, at the centre of the Dannebrog, is Vasa impaling Pontecorvo. Vasa is tierced in bend, blue, silver, and red, a gold sheaf or vase. Pontecorvo has a blue shield, and in chief an eagle of the French Empire, gold. In base a three-arched, towered bridge over a river, silver. The whole is surrounded by the collar of the Order of the Seraphim. The supporters are rampant lions with double tails.

Switzerland. Switzerland bears a red shield with a white cross in the centre. The arms of the cross do not touch the edges of the shield. See NATIONAL FLAGS.

Turkey. Gold on red, the Arabic cipher of the reigning sultan. See TOGHRA.

SOUTH AND CENTRAL AMERICA

Argentina. This is an oval coat of arms made by a wreath topped by a demisun in

splendor. The oval is divided by a horizontal line in the centre, with blue in the upper half and white below. A pair of hands clasped hold a staff, which is surmounted by a Phrygian cap, used here as the symbol of republican government.

Bolivia. A trophy of flags, three on a side, and the muzzles of four rifles with bayonets. The central space is an oval divided horizontally. The word Bolivia on the gold border of the upper half and nine stars on the blue border below. A landscape of mountain, sun, tree, sheep, and a garb occupy the centre, and a condor spreads its wings above the whole.

Brazil. A five-pointed star of green and white contains a central circle of blue on which the stars of the Southern Cross appear. The border contains 20 stars. The large star lies on golden rays with wreath of laurel, and an upright sword stands behind. The country's name is on a ribbon below.

Chile. A shield of blue (above) and red, bearing a single white star. Supporters an eagle and a stag, surmounted by three plumes, red, white, and blue.

Colombia. A trophy of flags, two on a side. A condor is above a shield containing in chief three gold cornucopias on blue; in fess a liberty cap, red on silver; in base a sea scene with ocean, harbor, ships, and land.

Costa Rica. A trophy of flags and weapons, a ribbon with the country's name, a shield with five golden stars, mountains, ocean, and harbor, with two ships. Above all a fillet with *América Central* on it.

Cuba. A shield, backed by the fasces and the liberty cap, surrounded by the laurel and a native shrub. In chief a landscape of rising sun in red and a golden key. Below the colors blue and white and a scene with a native tree and mountains in the rear.

Dominican Republic. A shield bearing a white cross, the quarters, blue and red alternately, showing a trophy of flags, a Bible, and a cross. A wreath of palm and native shrub. Below a blue ribbon has the country's name and the words *Dios patria libertad.*

Ecuador. A trophy of four flags, an oval with the fasces below and a condor above. In the oval are the sun amid the signs of the zodiac and a scene with mountains, sea, islands, and a steamer.

Guatemala. A wreath surrounding a scroll with the words *Libertad 15 de Setiembre 1821,* backed by guns, bayonets, and swords, forms the arms. The gaudily plumed quetzal is perched upon the scroll.

Haiti. A trophy of cannon, flags and rifles, drums and an anchor. The fasces, from which sprout palms, and above the liberty cap.

Honduras. A landscape with trees and habitations, two cornucopias, an oval bearing the words *Repca. de Honduras libre soberana independiente, 1821.*

Mexico. Above a wreath and standing on the prickly pear, an eagle rising, with a snake in its mouth.

Nicaragua. A trophy of flags, cannon, battle-axes, rifles, and bayonets, inclosed in a wreath of laurel, surrounds a triangle. A water scene with five islands and rising sun; the central island bears the liberty cap upon a pole.

Peru. A shield, in chief a llama gold on blue, a green cinchona tree on white, and below a gold cornucopia, filled with gold coins, on red. The shield is surrounded by a spray of laurel and palm, with a wreath of the same above.

Salvador. A trophy of flags surrounded by a laurel wreath. A triangle with five mountains, the liberty cap with rays on a staff, the date, and a rainbow above the cap. The motto, *Dios—Unión—Libertad.* Completing the white circle of the badge, the words *República del Salvador en la América Central.*

Venezuela. A shield, in chief a garb of gold on red. The flag, with swords on gold. In base a white horse on green earth and backed by an azure sky. Above are two cornucopias, and the laurel and palm flank the shield. The motto gives the dates 1811 and 1864 for founding and independence.

ASIA

The emblems of Japan and China, though national in character, are not coats of arms in the ordinary sense, and naturally they cannot be heraldically described. They are not borne on a shield, and are not armorial bearings in the true meaning of the term. They correspond more nearly to what are called badges, and are emblematic.

China. The national emblem of China is a combination of many elements, but is not strictly a coat of arms. The principal element is the steel blade of a hatchet, colored pale blue. The edge is downward, and the hatchet indicates decisiveness. Upon the hatchet are 10 grains of rice (silver). Inclosed in a red space, bounded by a golden border of slightly diverging sides and pointed top, is a golden rice plant. This represents the nourishment or sustenance of the people. Perched on the sloping back of the hatchet, on the dexter side, is a flowery fowl, somewhat resembling a bird of paradise. The back is green and the breast red. This bird typifies beauty. About it are strands of green aquatic grass signifying purity. A sprig of the same plant is in the beak, while above its head are three stars, drawn like pearls. In one talon it holds a temple cup (silver), which has the symbolic meaning of filial piety. On the sinister side of the hatchet is a green dragon, meaning changeableness. Conventional three-tongued red bursts of flame over and below the dragon indicate brightness. In one claw is the silver cup of filial piety. Above the dragon's head is a crescent moon, and above the whole is a representation of the great red sun. The (pearl) stars above the bird, the moon above the dragon, and the sun above them all typify light. The pointed top of the figure containing the rice plant on the hatchet is intended to suggest a mountain, standing for command. Below the edge of the hatchet, and woven about with artistically twining ribbons, is a curious zigzag symbol, made up of four parts, each like the block letter U laid on its side. These are placed back to back in pairs. It is a very ancient symbol, probably derived from the holding device or buckle for a priest's girdle or belt, and signifies sound judgment.

Japan. The personal badge of the Mikado is a golden chrysanthemum of 16 rays. In the standard it appears on the red ground of the flag, but it has no distinctive background on which it habitually stands. When used by a representative of the Mikado's government it may be displayed on any suitable or convenient color, or it may be shown without a background.

Bibliography. Under HERALDRY and NA-

NATIONAL COATS OF ARMS

MEXICO

GUATEMALA

HONDURAS

SALVADOR

NICARAGUA

COSTA RICA

CUBA

HAITI

UNITED STATES

SANTO DOMINGO

BRAZIL

VENEZUELA

COLOMBIA

ECUADOR

PERU

CHILE

BOLIVIA

ARGENTINE
REPUBLIC

URUGUAY

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TIONAL FLAGS will be found a complete and useful bibliography of works on national arms.

NATIONAL ASSEMBLY. See ASSEMBLY, NATIONAL.

NATIONAL BANKS. See BANKS, BANKING.

NATIONAL CEMETERIES. In the United States, cemeteries provided and maintained by the Federal government for the interment, free of cost, of officers, cadets, and enlisted men of the army, navy, marine corps, and revenue-cutter service, and army and navy paymaster clerks, who have died in the regular or volunteer service of the United States or who die after having been mustered out or honorably discharged. The same rights are accorded any nurses who are honorably discharged or pensioned. The presentation of the commission, warrant, or honorable discharge of the deceased officer, enlisted man, or army nurse, or the letter of appointment of the deceased army and navy paymaster clerk, signed by the Secretary of War or Navy, as the case may be, is sufficient authority for the interment. If the honorable discharge is not available as evidence of service, the interment may be made upon presentation of a pension certificate. Service as an officer or as an enlisted man in the State militia or National Guard, even though the decedent drew a pension on account of such service, does not entitle to interment in a national cemetery unless the organization was mustered into the service of the United States. When the statement of service shows the decedent to have been a general prisoner, a deserter, or a dishonorably discharged man, interment will not be made. Wives of officers and enlisted men may be interred in national cemeteries under regulations prescribed by the War Department. National cemeteries are under the charge of the quartermaster-general of the army, War Department, Washington, D. C., to whom all communications should be addressed. His representative is the officer of the quartermaster corps nearest the cemetery. Superintendents and assistant superintendents, who reside at the cemeteries, have immediate supervision thereof. They are usually selected and appointed by the quartermaster-general from among veterans of the Civil or other wars of the United States. They must be physically and mentally qualified for such duty. There are 84 cemeteries, all of which are within the continental limits of the United States, except one in the city of Mexico, Mexico. They are located as follows:

UNITED STATES NATIONAL CEMETERIES

Alexandria, La.
Alexandria, Va.
Andersonville, Ga.
Andrew Johnson (Greeneville), Tenn.
Annapolis, Md.
Antietam (Sharpsburg), Md.
Arlington, Va.
Balls Bluff (Leesburg), Va.
Barrancas, Fla.
Baton Rouge, La.
Battleground (Washington), D. C.
Beaufort, S. C.
Beverly, N. J.
Brownsville, Tex.
Camp Butler, Ill.
Camp Nelson, Ky.
Cave Hill (Louisville), Ky.
Chalmette, La.
Chattanooga, Tenn.
City Point, Va.
Cold Harbor, Va.
Corinth, Miss.
Crown Hill (Indianapolis), Ind.
Culpeper, Va.
Custer Battlefield (Crow Agency), Mont.
Cypress Hills (Brooklyn), N. Y.
Danville, Ky.
Danville, Va.
Fayetteville, Ark.
Finns Point (Salem), N. J.
Florence, S. C.
Fort Donelson (Dover), Tenn.
Fort Gibson, Okla.
Fort Harrison (Varina Grove), Va.
Fort Leavenworth, Kans.
Fort McPherson (Maxwell), Neb.
Fort Scott, Kans.
Fort Smith, Ark.
Fredericksburg, Va.
Gettysburg, Pa.
Glendale, Va.
Grafton, W. Va.
Hampton, Va.
Jefferson Barracks, Mo.
Jefferson City, Mo.
Keokuk, Iowa.
Knoxville, Tenn.
Lebanon, Ky.
Lexington, Ky.
Little Rock, Ark.
Loudon Park (Baltimore), Md.
Marietta, Ga.
Memphis, Tenn.
Mexico City, Mexico.
Mill Springs (Nancy), Ky.
Mobile, Ala.
Mound City, Ill.
Nashville, Tenn.
Natchez, Miss.
New Albany, Ind.
Newbern, N. C.
Philadelphia, Pa.
Poplar Grove (Petersburg), Va.
Port Hudson, La.
Quincy, Ill.
Raleigh, N. C.
Richmond, Va.
Rock Island, Ill.
Salisbury, N. C.
San Antonio, Tex.
San Francisco, Cal.
Santa Fe, N. Mex.
Seven Pines, Va.
Shiloh (Pittsburg Landing), Tenn.
Soldiers' Home (Washington), D. C.
Springfield, Mo.
St. Augustine, Fla.
Staunton, Va.
Stone River (Murfreesboro), Tenn.
Vicksburg, Miss.
Wilmington, N. C.
Winchester, Va.
Woodlawn (Elmira), N. Y.
Yorktown, Va.

NATIONAL CIVIC FEDERATION, THE. An organization of prominent representatives of capital, labor, and the general public, formed as the direct outgrowth of conventions held in Chicago and New York in 1900–01. Its purpose is to organize the best brains of the nation in an educational movement seeking the solution of some of the great problems related to social and industrial progress; to provide for study and discussion of questions of national import; to aid thus in the crystallization of the most enlightened public opinion; and, when desirable, to promote legislation in accordance therewith. In 1915 the work of the Federation was carried on through the following agencies: 1. The Industrial Conciliation Department, dealing entirely with strikes, lockouts, and trade agreements. Its membership included representatives of the general public and the leading organizations of employers and wage earners. The services of this department have been enlisted in more than 500 cases, involving every phase of industrial controversy. 2. The Industrial Economics Department, organized to promote discussion of practical economic and social problems. 3. Welfare Department, composed of employers of labor in stores, factories, mines, and on railroads, officials who have to do with the working conditions of public employees, chairmen of boards of health, heads of departments of public safety, leading physicians connected with public hospitals, heads of charity boards, and others. 4. The Woman's Department, composed largely of women who are themselves stockholders or who through family relationships are financially interested in industrial organizations. The object of this department is to use its influence in securing needed improvements in the working and living conditions of women and men wage earners in the various industries and governmental institutions and to coöperate, when practicable, in the general work of the Federation. 5. The Department on Compensation for Industrial Accidents and their Prevention, composed of employers, representative labor men, attorneys, insurance experts, economists, State officials, members of State compensation commissions, and others concerned. Its object is to advocate the amendment of State laws on employers' liability, with a view to securing uniform provisions looking towards compensation for industrial accidents, and to look into means of preventing accidents in commercial and manufacturing enterprises. 6. Social Insurance De-

partment, to investigate the need for uniformity of State legislation governing insurance plans relating to sickness, death benefits for widows and orphans, old-age pensions, or unemployment. 7. Department on Regulation of Combinations and Trusts, working for coördination of Federal and State laws and unification of the latter. 8. Department on Regulation of Interstate and Municipal Utilities. It has published *Commission Regulation of Public Utilities*, a compilation and analysis of laws of 43 States and of the Federal government for the regulation by central commissions of railroads and other public utilities. 9. The Pure Food and Drugs Department, composed of representatives of State food and dairy departments, public-health associations, and organizations of physicians, farmers, wage earners, and food and drug manufacturers, as well as large individual employers of labor. Its object is to promote uniform legislation on this subject among the States, work for effective coöperation between State and Federal governments, and stimulate the public to demand a better enforcement of existing laws.

NATIONAL COATS OF ARMS. See NATIONAL ARMS.

NATIONAL CONFERENCE OF CHARITIES AND CORRECTION. A body composed of the State boards of public charities, where they exist; of delegates appointed by the governors of other States; of charity organization societies and associated charities throughout the United States; and of persons connected officially or unofficially with charity work. It holds annual meetings in some city determined upon at a preceding meeting of the Conference. It has no formal constitution. The Conference maintains a bureau of information on all subjects concerning charity and corrections, and publishes annually its *Proceedings* and *National Bulletin*.

NATIONAL CONVENTION, IN FRENCH HISTORY. See CONVENTION, NATIONAL.

NATIONAL COVENANT. The league formed by the Scottish Presbyterians in 1638, being one of the famous covenants (q.v.).

NATIONAL DEBT. See DEBT, PUBLIC.

NATIONAL EDUCATION, SYSTEMS OF. A system of national education may be said to exist wherever the sovereign authority in a nation takes part in the establishment, maintenance, or to any considerable extent the regulation of the agencies for the education of the people. In ancient times and among the antique civilizations that survive to-day state systems of education are found. Such systems are (1) theocratic, where the priesthood, who form a ruling caste or are intimately connected therewith, carry on education; (2) examining, where the state conducts tests for citizenship or official position, thus indirectly determining the character of the instruction; or (3) martial, where the state aims to prepare its youth for citizenship, which is practically equivalent to membership in its army. The Roman government regulated education to some extent, and the emperors endowed many institutions of learning. With the fall of the Roman Empire and the appearance of the mediæval ecclesiastical system, the Church assumed control of education in Europe and resented any encroachment of the state upon its domain. The Reformation, however, by placing wherever it prevailed the control of religion in the hands of the state, transferred to the secular authority the control of education as well. The modern emphasis on the necessity of education for all, not only in religion, but also in letters, led to a broader popular education than had hitherto existed. The multiplication of sects that was an outcome of the Protestant movement brought about so much warfare regarding religious instruction that in most of the advanced nations it has largely or entirely disappeared from the curriculum of the state schools. Thus the modern systems, concerned principally with secular instruction, and controlled by the state, have come to exist.

The development of modern national support and control of education has in general followed this order: first the regulation, then the partial support, and finally the assumption by the state of almost the entire responsibility for the education within its borders.

The result of the vigorous efforts of the most progressive states within the nineteenth century is the almost entire disappearance of illiteracy within their borders. Germany, Switzerland, and Sweden find less than 1 per cent of their conscripts unable to read and write. In Holland, England, and France the proportion of illiteracy grows greater, 3.3 per cent of the French recruits in 1907 being ignorant of letters. In Italy the percentage of illiterate conscripts in 1905 was 30.06, and the marriage register shows that 38.7 per cent of the women called upon to sign it were unable to do so; of the total population over 21 years of age in 1911, 34.7 per cent of the males and 48.5 per cent of the females were illiterate. In Spain the percentage of illiteracy was estimated as 68 per cent in 1889, and this proportion was reduced about 10 per cent by 1900. In the United States in 1900, 10 per cent of the population over 10 years of age could neither read nor write; but this was reduced in 1910 to 7.7 per cent. This large proportion, however, is due to the enormous negro population and to extensive immigration from eastern and southern Europe. Only 7 per cent of the native population over 10 years of age was illiterate in 1900 and 10 years later only 3.7 per cent. Doubtless the proportion of illiterate adults whose parents were native would in America (if we exclude negroes) be about as small as that of illiterate conscripts in the European states having the most effective systems of popular education. In the two years 1913–15 strenuous efforts were made to eliminate illiteracy and classes for adults were established in the more backward parts of the country.

In 1912–13, 19.03 per cent of the population of the United States were enrolled in elementary schools. Canada and Switzerland show about the same percentages. Then follow England, Germany, the Netherlands, and Norway. Italy had only 9 per cent of her population in elementary schools in 1911, while in Russia this percentage was 3.6. The United States also leads in the amount expended for elementary education, whether we calculate the rate of expenditure per capita on the total population or per pupil on the enrollment in the schools. The average expenditure per pupil in average attendance in 1911–12 was $36.30, about double that of either England, France, or Prussia. Italy spent, in 1902–03, $5.30 per pupil; Russia still less. The United States spent on elementary education, in 1911–12, $4.76 per capita on

the total population. England followed with about $1.75 per capita. The statistics given above as well as those that follow are in each case the latest available. In making the comparisons differences in methods of arriving at the totals and other conditions must be taken into account.

CANADA

An outline of the technical and administrative features of the Canadian educational system will be found in the article CANADA. As therein stated, each province is left to legislate for its own educational affairs, but its exclusive lawmaking powers are subject to provisions which safeguard the educational rights of religious minorities as they existed in each province at Confederation (1867), and which in certain cases authorize remedial legislation by the Dominion Parliament. It is difficult to understand the Canadian system apart from its racial and religious factors. Ordinarily the fact that in regard to education each province regulates its own affairs would imply the purely provincial character of educational questions, but in Canada such questions are frequently of national importance and engage the passionate interest of the whole Dominion. The explanation is found in the proportion which (1) Canadians of French descent and (2) Canadians professing the Roman Catholic religion respectively bear to the whole population. In 1911, out of a total population of 7,206,643, the French numbered 2,054,890, or 28.51 per cent; while Roman Catholics of various races numbered 2,833,041, or 39.32 per cent. The result is that a dispute over the educational rights of the French minority in Manitoba at once becomes the intimate concern of the French majority in Quebec; while the increase of the French population in Ontario and the accompanying demand for bilingual schools excite in that province a Protestant reaction which is rapidly communicated to the other provinces. Politically speaking, therefore, an educational dispute in any province is liable to be taken up by racial or religious sympathizers throughout Canada. The educational ideals and practice imposed by the Roman Catholic hierarchy and those inherited by the English-speaking Protestants are the chief agencies by which the political rivalry of two civilizations under one flag is carried on. So long as this continues there is not likely to be any bridging of the educational gap between the Roman Catholic elementary schools, the Quebec classical colleges, and Laval University on the one hand and the English-speaking public schools and the unsectarian universities, whether provincial or of private foundation, on the other. The former are under strict, centralized ecclesiastical direction; the latter are under popular control, provincial and local.

Before 1900 the demand for bilingual schools was commonly made only in behalf of the French-Canadian population. Afterward it became more aggressive, and evidence of its indestructible motive was afforded by the French Language Congress of 1912 at the city of Quebec, which was attended by a thousand delegates from all parts of the continent where French is spoken. Since the beginning of the twentieth century the increasing volume and variety of immigration have extended the demand to include Germans and the different Slav and Scandinavian races. In Manitoba (q.v.) the problem is highly complicated. Bilingual schools are found in districts where the French, German, Polish, Ruthenian, and other nationalities are largely represented. These schools are not legal in Alberta and Saskatchewan, but the demand for them is such that a further increase of foreign immigrants cannot but suggest the political recognition of educational privileges similar to those enjoyed by the French-speaking population. In Ontario, Manitoba, Alberta, and Saskatchewan—British Columbia, and the Maritime Provinces are but slightly affected by this question, and Quebec has a place by itself—the position of the different governments, which most probably would be reflected by the preponderant sentiment of the whole country in a federal election, may be said to be unalterably fixed in favor of assuring English elementary schools for the people and the predominance of the English language in public-school teaching. But this has proved to be quite consistent with a liberal educational recognition of the languages and religious beliefs of the various races which compose the Dominion of Canada. Consult the *Educational Reports* of the different provincial governments.

FRANCE

The system of public instruction in France comprises three departments—primary, secondary, and higher. They are all under centralized control. At the head of the system stands the Minister of Public Instruction, who is a cabinet officer. Each of the great departments has a special director. The central administration includes, in addition, the Superior Council of Public Instruction and the general inspectors. The Superior Council consists of about 60 members, and has advisory and judicial functions. One-fourth of its members are appointed by the President. Other vacancies are filled by the Council itself. It has a committee to consult with the school authorities regarding school matters. Officials exist for the inspection of every phase of school work.

For convenience in educational administration France (including Algeria) is organized into 17 academies. Each one comprises a university, associated lycées and colleges, and the public primary schools within its limits. At the head are a rector, an academic council, composed of professors and officers of education, and an academic inspector. Under the academic inspectors serve the primary inspectors, who come in direct touch with the schools, each one having supervision of about 150. The departments of France, including Algiers, of which there are 90, constitute the next division for school administration. The prefect has the power of appointing elementary teachers, and there is an advisory council for primary schools, composed of teachers, school inspectors, and members of the civic council. In the communes the councils and mayors select sites for school buildings and vote the funds for the communal school expenditures. There are also committees formed to encourage school attendance.

It has been said that the control of schools in France is highly centralized. The President of the Republic appoints the Minister of Instruction, the general inspectors, the professors in the universities, the rectors of the academies, the prefects of the departments. The Minister of

Public Instruction appoints the rest of the officials of the central department, the central examination boards, the academy inspectors, the primary inspectors, the secondary teachers, the officials in the normal schools and in the superior elementary schools. The entire body of educational officials is therefore practically in the hands of the President, the Minister of Public Instruction, and the academic inspector.

The Superior Council deals with programmes for instruction, regulations for discipline, teaching, and school management generally, and hears appeals from the lower councils regarding schools that have been suppressed or have not been sanctioned by the lower authorities. It is the high court of appeal in all contentions. The academic council oversees courses of instruction in either higher or secondary schools, judges cases involving discipline of teachers or pupils therein, or the establishment or suppression of secondary schools. The departmental council has similar functions regarding the primary schools and determines their establishment, location, and the number of teachers. It also inspects them.

By the laws of 1890 and 1896 universities have been organized in each academy. Preparatory to them are lycées, or secondary schools maintained by the state, of which there were in 1912 for boys 112 and for girls 53; communal colleges, or secondary schools maintained by the local authorities, for boys, of which there were 230; and colleges for girls, numbering at that date 79. All these institutions take both boarders and day pupils. Besides these there were 57 secondary courses for girls. The primary schools may be grouped under five heads: (1) The *maternal schools*, which receive children between two and six years of age. From being schools for taking care of children whose mothers were out at service, they have become part of the educational scheme. They are supplemented by infant classes, which prepare the children for the elementary schools, and take the place of the maternal schools in small communities. To them are admitted children from four to seven years of age. (2) The *elementary primary schools* (*écoles primaires élémentaires*). These take children from 6 to 13, the work being divided into three grades of two years each. (3) The *superior primary schools* (*écoles primaires supérieures*). The place of these may be taken by the "complementary courses." The latter are partly review courses, partly advanced, with special attention to training for practical life. In them instruction lasts two years. There are two classes of superior primary schools—the professional and the nonprofessional. The first class includes commercial, technical, and industrial schools. The second has an advanced, liberal course for three years, supplementing it by considerable technical and industrial work during the rest of the time. It takes pupils from 12 to 18. It was originally designed to prepare for the secondary schools, but having a somewhat similar course, and being less aristocratic, it failed. It was revived with the addition of the vocational training in 1886. (4) The *apprentice schools*, which are sometimes classified as superior primary schools. Their name indicates their function, actual shop work being the centre of the curriculum. (5) The *primary normal schools*. Besides these there are two higher normal schools, which prepare teachers for the primary normal schools and the superior primary schools. There are 84 primary normal schools for men and 82 for women. They give a three years' course. The primary-school system is further supplemented by courses for adults offering either elementary, technical, or commercial instruction or lectures on subjects of general culture.

In the primary schools tuition is free. Moreover, by the Law of 1867 a fund to help pupils whose parents cannot supply them with clothes, books, etc., was created. Its establishment in each commune was decreed in 1882, the state agreeing to contribute. It is distributed by local committees, and in many cases children at school are even provided with dinners. In the superior primary schools bursaries exist to support deserving pupils taking the courses. At the age of 16 the holders of bursaries may be transferred to secondary schools with a continuation of their stipends. Bursaries also exist in the secondary schools, awarded on examination to students of limited means. Students are admitted to the normal schools on competitive examination. They are supported while there, and, when they graduate, are pledged to teach 10 years. They receive positions in the order of merit. Secondary and higher schools charge tuition, but, as they are largely provided for by the state, the amount of this is small.

The salaries of all administrators of schools, inspectors, and, except in the case of the communal colleges and in cities having over 150,000 inhabitants, teachers as well, are paid by the state. This brings about general uniformity. The salaries of primary teachers range from $220 to $540 a year; of normal school teachers from $500 to $1100; of professors in the lycées from $650 to $1720; of professors in the universities from $2400 to $3000. In primary schools of all kinds the teachers are divided, according to length of service and efficiency, into five grades, and in lycées into four. Salaries are based on this ranking. The teachers may, when they have served 30 years, and have reached the age of 60, receive a pension which amounts to one-sixtieth of the average salary during the last six years multiplied by the number of years served. To make up for this they contribute to a pension fund 5 per cent of their yearly salaries plus one-twelfth of their first year's salary and one-twelfth of each increase in salary for the first year of such increase. In addition to paying salaries and pensions the state supports the normal schools, the buildings for which are erected and equipped by the departments. The departments also furnish the supplies for them, and pay the office expenses incurred in running the departmental bureaus and the academic bureau of inspection. The communes pay for the supplies of the primary schools and local school officials, for janitors, and for the building and equipping of schools and residences for masters. In the building of primary schools, however, a state loan is available, the amount of which depends on the necessities of the commune, and varies from 15 to 80 per cent of the total cost of the work. The state also loans money to build normal schools. The universities, since their organization in the academies in 1896, have been thrown somewhat on their own resources and those of their localities. The state no longer equips laboratories or libraries, nor maintains new courses, nor builds new buildings.

The courses of study in the primary schools are in general determined by state laws. In addition, the Minister of Public Instruction, in

consultation with the Superior Council, determines the programmes of instruction even in details of considerable minuteness, and also rules for the conduct of the schools. The courses of study for the secondary schools are laid down by law, and the entire course occupies 11 years. Four years are spent in the primary department, and pupils can take this work in the free primary schools. They will, however, be under the disadvantage of not taking a course of three years in a modern language. The secondary school proper has a course of seven years, divided into two parts. During the first four years the work may be in either of two courses, in one of which Latin is obligatory and Greek optional and in the other neither is taken. For the last three years there are four courses presented for choice. These courses emphasize respectively Latin-Greek, Latin-modern languages, Latin-science, and science-modern languages. During the last year of the course options in either philosophy or mathematics are offered.

The programmes in all the secondary schools of France are rigidly laid down by statutes and regulations of the central Department of Education, and generally uniformity exists.

The system of inspection in France comes in to insure this uniformity in curriculum and methods. It extends to sanitary conditions as well as to instruction, although such inspection is in the hands of the regular medical inspectors of the localities. Uniformity of results is brought about by a regular system of examinations carried on by outside authorities. An examination for a certificate of primary studies may be given to pupils at the age of 11, and those passing are exempt from further compulsory attendance. It is carried on in the cantons by examiners appointed by the rectors of the academies. A special departmental commission holds yearly an examination for certificates in higher primary studies. The secondary schools also have their final examinations for the *baccalauréat*, conducted by outside examiners. Indeed, as the primary schools are the product of the central republican governments of France, so the lycées are part of the Imperial scheme of education devised by Napoleon, and both therefore are characterized by the system, uniformity, and dependence on central authority that their origin would insure.

Private schools in France require the sanction of the state, but can receive no support from public funds. The mayor or academic inspector can oppose them in the interests of hygiene, morals, or public order. They are free in regard to their programmes and methods, but their teachers must have received the certificate of capacity. For the most part they have been under the control of religious orders or congregations, and their large attendance was due to the demand for more religious instruction on the part of some classes. These congregations, however, were alleged to be in many cases hostile to the Republic. The Catholic orders were particularly aimed at in this charge. The ministry of Waldeck-Rousseau attacked their independence in the Law of Associations that became law on July 1, 1901. By it all congregations were required to obtain official authorization in order to get legal recognition as such. All unauthorized congregations were absolutely forbidden to give instruction. By this means a careful scrutiny of the conduct of the affairs of such bodies was made possible, and the character of their instruction inspected. The law contemplated the suppression of all congregations that resisted such scrutiny. During the year 1901–02 the ministry presided over by Premier Combes compelled many thousands of unauthorized clerical schools to close their doors. The Act of July 8, 1904, determined that within a period of 10 years from its promulgation all congregational teaching must cease.

The universities of France are discussed more at length under UNIVERSITY.

GREAT BRITAIN

The foundation of the present system is the Elementary Education Act of 1870. It declared that each district where sufficient facilities for elementary instruction were not in existence should provide them. Schools requiring denominational instruction or charging more than ninepence a week for tuition were not regarded as providing sufficient means for this purpose. The Education Department was required to make a statement of what was in each case demanded. In case voluntary provision to meet these demands was not forthcoming, a school board was to be elected in the district, which was to provide, to maintain, and to keep efficient the requisite elementary schools. Children attending board schools were to pay a weekly fee determined by the board, with the consent of the department, but this was to be omitted where parents were regarded as unable to pay. School boards were permitted to make provision for the compulsory attendance of children between 5 and 13 years of age, who were not elsewhere receiving efficient instruction, unless these children had attained the requisite standard of scholarship or were exempt under the Factory Acts. The board schools were to give no denominational instruction. The funds for the support of elementary schools were to be at the disposal of the boards, and were to be derived from parliamentary grants, loans, fees, and local rates. Power was given to the school boards to fix the amount of the local contribution for school purposes. Voluntary schools, wherever they existed, were recognized as before, and, in case they remained properly public and elementary, were to receive grants not greater than the amount contributed from other sources. Local rates were not to be levied for voluntary schools. In 1876 the age of compulsory education was extended to 14 years, and provision was made for the more effective enforcement of the law by punishing delinquents. This law was also made to apply to districts where there were no school boards, and it was enacted that children under 10 years of age should not be regularly employed at labor. In 1880 boards were required to make attendance compulsory. Subsequent legislation improved the evening schools (q.v.), turning their attention to technical and industrial education, started undenominational day training colleges, and greatly developed technical instruction. The poorer rural elementary schools have also received especial help. In 1890 the payment of tuition fees in elementary schools was abolished. In 1899 the Education Department was replaced by a Board of Education for England and Wales consisting of a president, the Lord President of the Council, the principal Secretaries of State, and the Chancellor of the Exchequer. The Act of 1902, which applies everywhere except to London (provided

for under a separate act) swept away the old school boards and attendance committees and replaced them by education authorities which are empowered to provide for all the schools in their respective districts out of the local rates. Whatever schools receive such support are under the general supervision of the local education authority. This authority is the council of the county, the county borough, noncounty borough with a population of over 10,000, or the urban districts with a population of over 20,000. It retains the right of levying the local rate and of borrowing money for school purposes, but hands over to a committee all other educational functions. The Education Committee is appointed according to a scheme determined by the local authority and approved by the Board of Education. A majority of its members are in most cases appointed by the council from its own number. Some of the others must be persons of experience in education, and the committee must include women. The Education Committee has power to determine the secular education to be given in the public elementary schools and to fix the number and educational qualifications of the teachers. Its consent is necessary to the appointment or dismissal of teachers except where religious considerations are involved.

Each school is under a board of managers, who elect teachers, control the school property, etc. The schools provided for wholly by the education authority are governed by managers appointed by it and by local authorities. Moreover, the denominational schools have on their managerial boards appointees from both these sources. No school that does not comply with the requirements of the Education Committee can receive even a government grant.

Parliament grants to all schools as grants in aid a sum equal to four shillings per scholar, and an additional three halfpence per scholar for every complete twopence per scholar by which the amount which would be produced by a penny rate in the area of the authority falls short of 10 shillings a scholar. Besides this grant the government also pays an annual grant of 13s. 4d. for children under five years of age and 21s. 4d. for children over this age; grants for instruction in special subjects, e.g., cookery, handicrafts, domestic science, etc.; grants for areas with small populations; and a fee grant of about 10s. per head for all children in schools complying with the conditions laid down in the Elementary Education Act of 1891. Whatever tuition fees are paid to schools maintained by an education authority are turned over to it, but a certain portion of these, such as may be agreed upon, is returned to the managers of the school. The proceeds of school endowments for the aid of elementary education are primarily devoted to the care of the school property. Whatever surplus there may be is turned over to the education authority.

Great progress has been made in English elementary education since 1902, largely in the direction of enriching the curriculum, providing instruction in special subjects to older children, developing manual work in all grades, paying greater attention to physical training and games, improving the schoolbuildings, and reducing the size of classes. Much social work is done through the schools; e.g., under the Education (provision of meals) Act, 1906, local authorities are empowered to provide meals to poor children, while under the Education (administrative provisions) Act, 1907, medical inspection is provided. More recently they have been permitted by the regulations to establish juvenile labor bureaus to offer vocational guidance to children on leaving school.

For pupils who cannot proceed to secondary schools and wish to continue their schooling beyond the elementary schools, there are the higher elementary schools. The length of the course is three years and the nature of the work is as a rule vocational. Owing to the restrictive character of the regulations of the Board of Education in the matter of higher elementary schools, a new type of intermediate school, known as central schools, with four-year industrial or commercial courses, has sprung up in London, Liverpool, Manchester, and elsewhere.

The managers of denominational schools are allowed to determine the religious instruction given therein and the religious qualifications of the teachers. But a pupil need not attend such instruction, and cannot be excluded from the school for religious reasons.

The Act of 1902 was bitterly opposed by the Nonconformists. The voluntary schools are largely under the control of the Church of England, and the use of a local rate for their support was regarded as taxing Nonconformists for the benefit of the institutions of the Established church.

For the training of elementary teachers there was in 1911–12 a total of 87 training colleges, of which 18 were attached to some university or college of university rank. Teachers are appointed by the education committees, usually on the nomination of the local school managers or the principals, who are always consulted. The average annual salary of certificated masters is about £121 and of mistresses about £80. In 1898 provision was made for pensioning teachers who have reached the age of 65 or have become disabled. The amount is estimated on the basis of length of service, and is partly made up by an annual contribution on the part of men of £3 and of women £2. Government inspectors are appointed by the crown on recommendation of the Board of Education, but besides the government system of inspection a local system has been developed in the larger areas, corresponding in some measure to supervisors or assistant superintendents in large American school systems. The pupil teachers constitute a large proportion of the teaching staff, the law allowing three for the principal teacher in each school and one for every certificated assistant teacher. The system of grants in aid of their training still prevails.

For secondary education England has schools under a variety of authorities. They may be classed, according to method of control, as private enterprise schools, subscribers' schools, companies' schools, endowed schools, and municipal secondary schools under local authorities. There were 6209 such schools in England in 1897. They are not organized under any system, except that the charity and other commissions have been revising the courses of study in the endowed schools. (See ENDOWED SCHOOLS ACTS.) The Public Schools Act of 1868 revised the control and organization of seven great public boarding schools of England. Wales and Monmouthshire have a system of inspection of secondary schools. One of the main purposes of the Act of 1902 was the support of secondary education by public

money. The education authorities are authorized to consider within their areas the needs of secondary education and to take such steps as seem to them desirable, after consulting the Board of Education, to supply or aid in the supply of such instruction. For this purpose the county authorities are empowered to raise a county rate of twopence in the pound, a sum that may be increased with the consent of the Local Government Board. This measure has led to the development of a large number of secondary schools under local authorities and to the more adequate provision of secondary-school facilities for girls. The Board of Education has issued regulations for the management and organization of secondary schools, the two main requirements being the provision of a certain percentage of free places for pupils from elementary schools and the acceptance of inspection by the board. Schools which accept these regulations receive a government grant. A large number of secondary schools which submit to inspection by the board but are unwilling to comply with the remaining requirements are further classed as "efficient," but receive no grant. In 1911–12 there were 995 grant-earning schools and 102 schools recognized as efficient.

The Scotch have had a public elementary system since 1696, when it was ordained that a school should be established in every parish where one was not in existence. The masters were elected by the landowners and the ministers, and held their places for life or good behavior. The act was amended in 1803 so as to require the salaries of masters to be raised, and in 1861 their examination for the right to teach was transferred from the control of the presbyteries to that of the universities. In the meantime considerable support was granted to the schools by the government. Among other changes the English School Code of 1861 was applied in Scotland, but was withdrawn. In 1872 an elementary-education act like the English one was passed. The Scottish law is the better of the two, however, school boards being created in every parish, and the practical control of all elementary schools being given to them. In 1893, after several movements in that direction, all children between 3 and 15 years of age were freed from school fees in the public elementary schools. Education is compulsory for children between 5 and 14 years of age. In 1906 a new classification of schools was adopted—primary, intermediate, and secondary. The primary school receives pupils up to the age of 14, but pupils may take a qualifying examination at the age of 12 and on passing this may elect to continue in a supplementary course (commercial, industrial, rural, or domestic) intended for those leaving at the age of 14, in an intermediate course of three years (12 to 15) which is practically the first stage of a secondary school, or in a secondary school providing a course of at least five years.

The government grants to Scottish voluntary and board schools are, in general, similar to those in England, but only about one-eighth of the elementary schools are voluntary. For the training of elementary teachers denominational colleges had made their appearance before 1839. These have been aided by government grants, and at present over four-fifths of the male and two-thirds of the female teachers have graduated therefrom. The English Pension Act of 1898 was extended to Scotland.

The secondary instruction in Scotland is in the hands of five classes of schools—burgh schools, academies, parochial schools, mixed burgh and parochial schools, and four public boarding schools like those of England. The burgh schools are supported either by endowment or by burgh funds. They are under the control of the authorities of the burgh and are open to the community. Until 1861 the presbyteries controlled them, but at that date this power was transferred to the town councils, and in 1872 to the school boards. These bodies fix the fees. The academies arose in the middle of the eighteenth century as a result of a demand for more economical and scientific instruction. In most cases they came ultimately under the joint control of town councils and proprietors. In 1892 government grants were made to secondary schools, and their inspection was provided for. At the same time secondary-education committees were established as district committees in the 33 counties, the 5 chief burghs, and 1 large parish. These committees are concerned with the distribution in their districts of the government grants, now paid under the Education (Scotland) Fund, 1908, and with all forms of education beyond the resources of individual school boards. Since 1888 the Education Department conducts an examination in the courses provided in the secondary schools leading to the leaving certificate, which under certain conditions is accepted for entrance to the universities. In 1911–12 there were 56 grant-receiving schools, of which 35 were maintained by school boards. For the universities of Great Britain, which through the development of a large number of new degree-granting bodies since 1900 have had a remarkable growth, see UNIVERSITY.

For a further treatment of the English educational system, see GREAT BRITAIN, *Education*.

The educational system of Ireland is distinct from that of England and Scotland. Elementary education is controlled by the National Board, which was founded in 1831. The schools are administered and maintained on denominational lines, but a compulsory conscience clause exists under which pupils are exempted from religious instruction when their beliefs conflict with it. The usual subjects of elementary instruction are given. Irish has developed rapidly in the elementary schools since 1900 and is now studied by more than 200,000 pupils. Under the encouragement of the Department of Agriculture and Technical Instruction domestic-science subjects and manual instruction have also been introduced. In 1912 there were 8255 elementary schools with 668,974 pupils on the roll and an average attendance of 499,038 pupils. The denominational distribution is indicated in the following figures: 4397 schools were attended by 373,154 pupils of the Roman Catholic faith—1549 by 117,985 pupils of the Protestant faith—and 2303 schools were mixed and were attended by 177,579 pupils. The expenditure out of Imperial taxes and rates on elementary education in 1912–13 was $8,829,185.

Secondary or intermediate education is under the supervision of the Intermediate Education Board, which conducts examinations of pupils in secondary-school subjects, on the basis of which grants are distributed, and also, since 1909, inspects schools. The Roman Catholic schools are conducted largely by teaching orders of that denomination, but recently the board is insisting on the appointment of a number of lay

teachers as a condition of the grant. In 1912 the board examined 12,581 pupils (8276 boys and 4305 girls). The expenditure of the board in grants for intermediate education in 1912 was $250,990.

Technical and agricultural education is supervised and subsidized by the Department of Agriculture and Technical Instruction, which, since its establishment in 1900, has greatly assisted the development of technical schools and the teaching of agriculture, science, domestic subjects, drawing, and manual training, not only in the technical schools but also in evening schools and in day secondary and elementary schools. For higher education in Ireland, see under UNIVERSITY.

HOLLAND

The state school system in Holland includes public primary schools, normal schools and courses, burgher schools, higher burgher schools, or secondary schools proper, industrial and technical schools, agricultural schools, and various professional institutions, together with Gymnasia, and three state universities. A few of the primary schools are maintained solely by the general government. Most of them are communal, but a considerable portion of the fund for their support comes from the state. Private primary schools are also subsidized by the government, in case they maintain proper standards. The primary-school system includes, in addition, repetition and evening schools, and both types are maintained by the same agencies and methods as the primary schools in general. So, too, the normal schools are either government schools, or communal schools with subsidies or private schools with similar support. The state normal schools, however, give instruction to the majority of the students taking such courses. The higher burgher schools were, in 1910, 81 in number. Of these 27 were maintained by the government, 47 were communal, and 7 private schools. There were in addition 61 Gymnasia or classical schools (30 publicly and 31 privately maintained).

The history of this school system will serve to explain these peculiarities and also to make somewhat clearer the complexities of the system itself. In 1784 a Society of Public Good was founded at Groningen by John Nieuvenhuysen. Its object was to promote elementary education, and in this it was successful, receiving help from the government. In 1806 an education law of great importance was passed. It consisted essentially of provisions for inspecting schools and examining and certificating teachers. School districts were organized, over each of which an inspector was placed, whose consent was requisite before any one could teach or be a member of a school committee. The inspectors received for their services only an allowance for their expenses. A principal duty was that of examining teachers for certificates. The provincial and communal administrations were urged by the government to provide the means of instruction in their localities, to insure a comfortable subsistence for teachers, and to obtain a regular attendance of children in the schools. Free schools for the poor were, as a result, established in the towns and in the villages—schools to which the poor were admitted gratuitously. The authorities made great and successful efforts to gain a large attendance, and teachers were paid better salaries than elsewhere in Europe. In 1811 M. Cuvier found 4511 primary schools in existence, and 1 in each 10 of the population in school.

Up to 1848 only two important steps had been taken in the further development of the system. Normal schools were established in 1816, and the free schools for the poor were supplemented by institutions of a somewhat higher grade where a small tuition fee was required. Since the free schools could be entered only by those who possessed a certificate of poverty, the children of people with moderate means were excluded from them. The private schools for such children were fast becoming inferior to the free schools which were under public patronage, and it was to supply this want that the towns established intermediate schools (*tusschen schoolen*). In addition, French schools, which emphasized modern languages and commercial branches, and Latin schools, preparing for the universities, were founded.

The constitution of 1848 established liberty of instruction. This conflicted with the provision of the Law of 1806 that the authorizations of the municipal council and of the inspector were necessary for even the teacher in a private school. In 1857 this requirement was removed, only the general admission certificate being demanded in such cases. The constitution of 1848, also, by placing all religious denominations on a footing of equality, gave to the Catholics and liberals a chance to attack the religious instruction in the schools, which according to the Law of 1806 was to have been Christian but undenominational. Their agitation led to a strict enforcement of the law, which in turn roused the antagonism of the orthodox Protestants. The result of a bitter contest was the Law of 1857, which reaffirmed that of 1806, making more explicit its provision that religious instruction, while undenominational, should yet inculcate Christian virtues. It was also provided that the schoolrooms should at special hours be put at the disposal of religious communions for purposes of instruction. This attitude was confirmed by the Law of 1878.

Under the Law of 1857 each commune was required to maintain at its own charge what in the opinion of the state's deputies and the supreme government was a sufficient number of primary schools. If this task was too heavy, the state and the province were to share equally in a grant of aid. It was provided that pupil teachers should aid in the work of instruction. School fees were to be exacted only of those who could afford to pay them. The public schoolmaster was to be selected by the communal council from a list of those who had acquitted themselves best in a competitive examination. A salaried provincial inspector was substituted for the provincial commission of district inspectors. The Minister of the Home Department, assisted by a referendary, was made the supreme authority in matters connected with education.

In 1863 a law was passed organizing secondary instruction as consisting of burgher, higher burgher, agricultural, polytechnical, and industrial schools. This law was amended in 1876 and 1879. The secondary schools are under special commissions and inspectors, and teachers in them are required to have special diplomas and, except in a few cases, to be university graduates.

The Law of 1857 has been twice amended—in 1878 and 1889. In 1878 the school authorities were empowered to increase the curriculum as laid down in 1857, by French, German, English,

general history, mathematics, drawing, agriculture, and gymnastics, whenever they deemed it expedient. It was also provided that each commune should support the necessary number of unsectarian schools; but 30 per cent of its educational expenditures were to be contributed by the state, which also undertook to subsidize private schools under certain conditions. An enormous increase in the state contribution to popular education was thus brought about. In 1889 the method of granting the state subsidy was modified so as to include private schools as well. If the school applying for one is found on inspection to conform to the state regulations, it will be granted an amount dependent on the attendance, the number of teachers, and extent of the curriculum. All schools having more than 41 pupils must have at least two teachers, and an additional teacher is required for an average addition of about 50 pupils. When schools have more than the minimum requirement of teachers, and when they cover more than the required curriculum, additional grants are given. The state also furnishes 25 per cent of the amount necessary to establish a school, and regulates the character and hygienic conditions of the buildings and premises. The Law of 1878 instituted a system of pensions for teachers who had reached the age of 65. The annual amount is one-sixtieth of the annual salary for each year of service. The teachers contribute 2 per cent of their yearly salaries to a pension fund.

The Dutch classify their Gymnasia together with their universities under the head of superior instruction. Such instruction is organized into a system by the Law of 1876. The three state universities are supported and controlled by the national government. See UNIVERSITY.

PRUSSIA

The school system of Prussia may be divided into three departments—elementary, secondary, and higher. The elementary system is designed to educate children of the lower classes whose school training is completed in early years. The secondary schools are intended to prepare pupils for the universities or professional schools, which are for the most part classed as superior schools. The elementary school system may be grouped under five classes: (1) The *infant schools*. These are not supported by state funds, nor are the teachers required to have state certificates of capacity. They are, however, under the supervision of local school boards. Their purpose is to care for children whose parents are obliged to go out to work. Children are admitted ordinarily only in their third year, but in some cases even younger children are cared for. (2) The *Volksschule*. This takes children between the ages of 6 and 14, and during this period attendance is compulsory for all whose education is not otherwise provided. In the larger communities the sexes are taught separately, but in the country districts this is usually impossible on account of the lack of teachers and facilities. The school work occupies six hours a day and about 42 weeks a year. There are three stages and six to eight classes, though the work occupies eight years. The subjects of study are, in the lower stage, religion, German, arithmetic, singing, gymnastics, and needlework; in the middle stage, drawing, science, history, and geography are added; and in the upper stage, geometry. This course is prescribed by law, but within its limits selection and arrangement are left to the school board of the district, subject to the approval of the general board of the royal government. (3) The *continuation schools* give instruction to pupils between the ages of 14 and 18. They review the work of the Volksschule and give some additional work with special reference to trade or industry, or, in the country districts, agriculture. The schools are conducted so far as possible during the day and may not be held after 8 or 8.30 P.M. The tendency is to link up the work with the vocation of the students, and the aim is to secure general efficiency in the vocation and intelligent citizenship. Tuition is charged, but provision is made for those who cannot pay. With the continuation schools may be classed various industrial and trade schools which are day schools and devote more time and effort to prepare for specific vocations. (4) *Middle schools*. These sprang from the old burgher schools of the Middle Ages. They aim to prepare the children of people with more means for a commercial life, although sometimes they are attended by pupils preparing for the secondary schools. Tuition is charged. They continue and broaden the curriculum of the elementary schools and add one foreign language. Nearly twice as many of these schools as are public are private. A considerable proportion of them are mixed schools. They take the place of the Volksschule, but sometimes continue instruction until the seventeenth year. They have, however, not been marked by great success in Prussia, because no privileges are attached to graduation from these schools, and a pupil who can remain at school long enough prefers to attend a secondary school. (5) *Normal schools*. In these there is a preparatory course of three years to which children of 14 are admitted. This is followed by a two years' course in the women's normals and a three years' course in men's normals and the one for governesses. In 1913 there were 212 of these institutions, of which all but about 26 were for men exclusively. Students are admitted on examination, and the attendance is limited to from 30 to 36 in each class. While in the school students receive their support. On graduation they are placed on the list of available teachers and are required to take what is given them or pay back the expenses of their education. Before receiving permanent appointment, however, a probation of from two or five years is required, and an additional examination on educational matters must be passed. The normal-school course consists of pedagogics, religion, German, history, arithmetic, geometry, geography, drawing, writing, music, and a foreign language.

The secondary schools in Prussia, as in Germany generally, are the various classes of Gymnasia and Realschulen. The Gymnasium has a nine years' course. To enter it the pupil must be nine years of age and have had three years of elementary instruction. The Progymnasia give a somewhat shorter course, usually only the six years necessary to gain for their graduates exemption from one year of the voluntary service in the army. Occupying a position between the Gymnasium and the Realschule is the Realgymnasium, which omits Greek and gives more attention to sciences, etc. There are also Realprogymnasia. The Realschule proper gives only a six years' course, but the Oberrealschulen have nine years of work. As a result of a conference on secondary schools that met at Berlin

in 1900, the three classes of schools having a nine years' course are declared to be equal from the point of view of general culture and for purposes of matriculation at the universities, and Greek was made optional in the Gymnasia. The programme of studies was somewhat revised and greater latitude allowed the masters in adapting their work to particular needs. An important feature of secondary education in Germany is the privileges which are secured by the examinations: (1) The Einjährigenschein is obtained on an examination after six years of secondary work and entitles the holder to serve in a regiment of his choice for one year only. (2) The Abiturientenexamen, or leaving examination, entitles students who pass it to enter the universities or higher technical schools without further examination, with certain minor exceptions. The secondary education of girls has been reformed and has come increasingly under public control. Opportunity is now afforded since the regulations of 1908 for girls to continue their higher education beyond the age of 15 as formerly in the Höhere Mädchenschulen. Not only can they specialize in domestic science or for the teaching profession, but they may take secondary courses leading to the universities, similar to those open to boys.

The higher education of Prussia is given in the universities with their four faculties of philosophy, theology, law, and medicine. They are discussed in the article on UNIVERSITY. There are also various polytechnic and agricultural schools that may be included with the institutions for higher education.

At the head of the Prussian school system is the Ministry for Public Worship and Education, the former charge over public health having been removed in 1911 by the creation of a department of public health. For educational purposes two divisions are maintained in the Ministry. The first has control of superior and secondary instruction and the second of the elementary schools. The Minister of Education represents the schools in the Prussian Parliament and plans and oversees legislation on school matters, including finance. He distributes the state school money, appoints the members of provincial school boards, confers titles on school officers, judges on appeal all cases involving dismissal from office or other contentions in school matters, besides fixing the normal course of study. Each of the 13 provinces of Prussia constitutes a division for the administration of secondary education and training of teachers. The immediate superintendence of secondary schools is in charge of the provincial school boards, consisting of from three to five members and a chairman, who is the president of the province. One of these men inspects the Gymnasia, another the Realschulen, and a third the normal schools. This board has the power of appointing and dismissing teachers in secondary schools, except in such as are supported wholly or partly by private funds, where the selection is made by a local board from a list furnished by the provincial school board. The appointment of directors of the schools requires the confirmation of the Minister. To the provincial school boards also fall the control of the seminaries for the training of secondary teachers and the regulation for all the schools of the province, of the school programmes, regulations, leaving examinations, and of textbooks for the higher schools. In each province the general superintendent of the Evangelical church has the function of inspecting the Protestant religious instruction in the secondary schools, and a Catholic bishop has a similar right regarding Catholic instruction. The provinces of Prussia are divided into 36 governments, each of which has a school board consisting of two men appointed by the King for life, four appointed by the provincial school board for six years, and the president of the royal government. In such schools as are supported largely by the state this board appoints the teachers. Wherever, on account of extensive local support or private patronage, local authorities are given the naming of teachers, the school board of the government confirms their appointment or nominates a list from which the selection must be made. It also oversees the conduct and work of the teachers, superintends the elementary schools generally, settles upon new districts and textbooks for local schools. The governments are divided into districts, some of which have inspectors, whom the Minister on examination appoints for life, and who devote their whole time to the schools. Other districts have a number of local inspectors, who until recently were clergymen or had some other occupation besides that of school inspection. The tendency is more and more to appoint inspectors of professional experience. The district has a school board composed variously in different localities of inspectors, members of local councils, and representatives of religious denominations. This board has the power of erecting and organizing schools, determining teachers' salaries (the minimum being fixed by the government), increasing salaries and pensions, and deciding on property liable to a school tax. Each school has a local school board chosen in cities by the central school board. Sometimes, however, it is chosen by the citizens of a community or by a church organization or by a patron, generally according to the source whence the school derives the larger part of its income. The local board looks after repairs, supplies, and attendance, but cannot interfere with the internal management of the school. In many cases it has a voice in electing the teacher or fixing his salary. Many cities have established secondary schools, the funds for which are largely contributed by them. Here the local boards have charge of financial matters, choice of teachers, etc., but the work of the school itself is under the supervision of the provincial boards. The most extreme cases of local control arise in connection with the country Volksschulen, under the patronage of the nobility. Here the patron names the teacher, and sometimes even interferes with the course of study and school hours.

Private schools in Prussia are required to conform to state regulations as to minimum course of study, school methods, etc. They are under state inspection and can employ none but regularly certificated teachers. The number of private elementary schools is insignificant, but of the pupils in middle schools one-third are in private institutions.

Teachers in Prussian elementary schools are ordinarily graduates of teachers' seminaries or training colleges. At the end of each year these institutions hold an examination at which the school inspectors and superintendents of the district and a commission from the provincial school board are present. Practical tests in teaching power are required as well as those on theory. The successful candidate gets a privilege to teach for five years. After two years of satis-

factory work and not later than five years after the first appointment a teacher may take a second examination, the passing of which gives him a right to a permanent position and a pension. This examination is largely on educational matters and includes a practical test. Candidates who are not graduates of teachers' seminaries may be admitted to it, and on passing are allowed to teach. The director of the seminary supervises the work of its graduates and can require them to supply defects by additional work. Those who wish to teach in the higher classes of the middle schools must pass an additional examination given by a special commission, and the same body gives a still further examination to those who aspire to rectorships. To gain the right to teach in the secondary schools a candidate, who must have attended a university for at least six semesters, and often possesses a degree, must pass a state examination given by one of the 10 examining boards appointed annually by the Minister. Those who pass may receive, according to the character of their papers, any of three grades of certificates in the various subjects, and these entitle them to teach such subjects in the lower three, the lower six, or all the grades of the Gymnasia. After passing this examination a candidate enters a seminar, of which there are a number attached to secondary schools. Here he is under practical instruction for a year, entering at its successful conclusion on a year of probationary teaching, for which he receives no remuneration. He is then, provided his work is satisfactory, eligible to a permanent appointment.

Elementary teachers receive free rent and fuel, and often a garden. Their annual salaries range from a minimum of 1400 marks to as much as 3800 marks in Berlin, or in the case of rectors even 6000 marks. The average is, however, about 1200 marks and is smaller in the country than in the cities. Salaries usually are regularly graded, according to time of service, up to a maximum. Women are paid somewhat less than men, and they constitute about 17 per cent of the total teaching force in elementary schools. After 10 years of service the teacher can, if disabled or 65 years old, retire on a pension of one-third of his salary. This amount increases by one-sixtieth for each additional year of service up to two-thirds of the salary. Provision is also made for widows and children of teachers. The annual salaries of secondary school teachers range from 2700 to 5100 marks, and in the case of rectors to 7800 marks. In addition they receive an allowance for house rent. The same regulations as to pensions that apply to primary teachers apply also to secondary ones, and in fact to most state officials, an exception being professors in the universities, who, however, are not required to retire.

For the support of schools in Prussia there are five sources of income. The most important of these is the state itself, which pays about one-half of the total required for teachers' salaries. The other sources are school societies, income from inherited property, Church funds, local taxes, and tuition. In the city schools the local taxes supply the larger part of the income; in secondary schools the tuition furnishes nearly one-half the sum required for support. The country schools, however, receive over two-thirds of their income from the state, the amount being a fixed contribution of 100 marks for each head teacher, 200 marks for each additional regular male teacher, and 150 marks for each female teacher, with 100 marks for each assistant teacher who is in the probation year. The normal schools are supported by the government, as are also the universities and many secondary schools. In the latter tuition is a considerable item. For their organization, see UNIVERSITY.

For the development of the German public educational system, of which the Prussian system is taken as a type, see GERMANY, *Education*.

SWITZERLAND

Each of the 25 cantons of Switzerland has its own separate and independent school organization, and there are very few federal regulations on the subject. The federal constitution of 1874 empowers the Bund to establish and maintain or assist a university or other institution for "higher education." This power has not been used except to continue the support of the federal polytechnic at Zurich and to subsidize various cantonal higher institutions. But by a supplementary article in 1902 it is obliged to subsidize elementary education. In 1910 this subsidy for elementary education amounted to 2,026,500 francs. In the same way the central government has supported vocational education (arts and industries, commerce, agriculture, and domestic and vocational training of women) very liberally, 3,000,000 francs being granted in 1910. The constitution further states that all education, whether public or private, must be under the control of the cantons. They must provide for it and make it compulsory and gratuitous. That they do this well is evident from the fact that in 1898–99 the ratio of attendance to population was greater there than in any other country in the world, while of the recruits in 1899 only 0.23 per cent could not read, a figure reduced in 1910 to 0.1 per cent. All attempts to establish anything like a centralized system have met with determined opposition by those who feared interference with linguistic or religious instruction in the schools. The constitution provides, however, that "it must be possible for the public schools to be attended by the adherents of all beliefs without hurting their freedom of belief or conscience." That not more than 3 per cent of the attendance is in private schools, which are, moreover, patronized almost entirely by children of non-Swiss parentage, attests the satisfactory nature of the religious instruction in the public schools. A few cantons, as Geneva, exclude it entirely from the public system. Three additional federal regulations affect education. The first forbids the labor in factories of children under 14, and limits that of those under 16. The second prescribes an examination for every recruit on entering the army at his twentieth year. The results of this are made known, and it stimulates educational effort, besides bringing into existence improving schools for recruits and increasing the attendance at continuation schools. The final regulation concerns military drill, which by the Acts of 1874, 1877, and 1883 is made a required part of every school programme, to be given to children between 10 and 15 years of age.

At the foundation of the school system of Switzerland we have at present the communal primary schools taking children from 6 to 11 years of age. After this they go either to the cantonal secondary schools proper, or to the advanced elementary schools, the so-called second-

ary schools, the district for one of which embraces several communes, or to the communal continuation schools, usually held in the evening. There are also courses for adults given in the communes. The secondary schools are maintained by the cantons, and include professional and technical schools, with others variously styled middle schools, Gymnasia, or Progymnasia. These are supplemented by cantonal universities and a federal polytechnic. The teachers are licensed by cantonal governments on examination, or in some cantons on a diploma from a normal school. For the higher grades of work an additional examination is required. There were, in 1910–11, 49 normal schools in Switzerland, most of them public institutions maintained by the cantons. In most cantons teachers are elected for life, either by a school board or at a general election. They are also usually pensioned at the end of their term of service. This is, in general, partly provided for by a fund to which they make regular contributions.

At the head of education in each canton there is either (1) an educational council or (2) an education ministry, headed by a director of education, who is a member of the executive council of the canton, or (3) a permanent education council, presided over by a director of education, who is a political officer. The Canton of Bern belongs to the second type, and in the control of its schools it represents the extreme of centralization in Switzerland. The Director of Education controls the inspectors and frames the educational budget. His department determines, on consultation with certain authorities, the curriculum and methods of instruction in all public schools. Private schools must receive his authorization and that of the local school inspectors. The communal council votes the money for its primary schools, and nominates a school board to control the expenditure of this and the details of local school management. Several communes combine to form a secondary school, the control of which is in the hands of a commission, whose members are appointed by the various communal councils and the Director of Education. The middle or higher schools are usually cantonal schools, and are controlled by a commission appointed by the Educational Department. On the other hand, the Canton of Zurich has the least centralized of all the Swiss systems. Its central government is of the third type above mentioned. The Educational Council is composed of six men, four of whom are chosen by the cantonal council and the other two by the whole body of teachers. It controls the organization of education in the canton. The commissions that direct the cantonal schools, i.e., the Gymnasium, middle schools, higher schools, technical institutes, and training colleges, are appointed by the cantonal council on nomination by the Educational Council and Director of Education. For local organization and control of education there are provinces, districts, and communes. Each province has a committee, elected partly by the teachers alone, partly by the rest of the voters. Its function is to visit the schools and supervise their general conduct. There is a district committee elected by the voters to control the secondary school of the district and determine the amount to be raised from local taxation for its support. For the primary school also there is a district organization, including usually several communes, the voters of which have a general assembly to determine school measures. The communal primary school is controlled by its local board. In Zurich alone of all the Swiss cantons there are no school inspectors. In these two cantons, Zurich and Bern, we have illustrated the extremes between which the systems of the other cantons fall.

In Switzerland, generally, the support of all universities and higher secondary schools is by cantonal funds, aided occasionally by the cities in which such schools may be situated. The district and communal schools are supported by local taxes with cantonal aid. There exist for such support permanent communal funds made up of fees and gifts. Moreover, 12 cantons have a permanent cantonal fund for Volksschule purposes. This does not, however, by any means provide for the support of the schools. Of the total expenditure on primary education it is estimated that the local authorities furnish about two thirds, the rest coming from the cantons; but in Geneva, where the French ideas prevail, the canton furnishes 74 per cent of such funds. In general, in the wealthier cantons the canton furnishes more and the commune less of the total raised. The total expenditure on instruction in 1910–11 was 86,400,000 francs (by the cantons 41,800,000 francs and by the communes 44,600,000 francs).

OTHER EUROPEAN SYSTEMS

The systems already described offer examples that are typical of the education in other European states. In Sweden elementary and secondary schools are supported by state subsidies and local taxes. Many schools and universities have in addition to such support the income from endowments. Control of schools is in the hands of local boards, but the central government maintains a system of inspection and requires teachers to be graduates of normal schools. Public elementary education is gratuitous and compulsory between the ages of 7 and 14. In Austria the ideals and methods of Prussian education prevail. The Italian system has the same general features of state subsidies and local and provincial taxes for the support of both elementary and secondary education. The minimum number of schools, the curricula, and the qualifications of teachers are also laid down by the state. Public elementary education is gratuitous and compulsory between the ages of six and nine. The state inspects all public schools, and private schools must receive authorization by the government.

In Spain attempts have been made to establish a complete and efficient system of elementary education. The government determines programmes and inspects schools, but furnishes little assistance to their support. The municipalities bear most of the burden, and the compulsory law is not enforced. For most of the children education is free. In Russia about one-third of the elementary education is carried on by the Church. Nearly all the rest is controlled and supported by the central government acting under the Ministry of Public Instruction. The Church also takes part in secondary education, but here the Ministry bears most of the responsibility. There are a small number of locally supported schools and foundation schools.

UNITED STATES

In the United States the control and support of the education of the people have been left

practically to the several state governments. The central government has, however, dealt with the matter in a few cases. The Ordinance of 1787 provided that one section of each township in the Northwest Territory should be designated as school land and that the proceeds of its sale should go to the support of public schools. After States were organized in this region the funds derived from these lands were turned over to them for educational purposes. Similar grants of land were made to other new States, notably in 1841, in 1849, and in 1860. Up to 1900 about 86,000,000 acres had been devoted to this purpose. These grants were supplemented in 1836 by a gift to the several States of surplus funds in the National Treasury, the sums thus given being by most of them devoted to the support of education. In 1862 the Morrill Act set aside additional lands for the maintenance of colleges in which agricultural and mechanical arts and military tactics were to be taught, and the State universities generally have been the recipients of these gifts. The central government established, in 1867, the Bureau of Education, the main objects of which are the collection of statistics and the preparation of reports.

Each of the several States maintains a system of free public schools, including elementary, secondary or high schools, and, in the case of 39 of them, universities as well. The older States, where great colleges and universities on private foundations have for a long time existed, have not in most cases added such institutions, but have developed, as in Massachusetts, Pennsylvania, and Maryland, systems of annual subsidies to them. For the elementary schools three systems of control exist. The first of these is the district system, according to which the control of each school is left in the hands of a board elected by the people of the district in which it is placed. Under the township system all schools that are located within the region of a township are placed under one board. According to the county system the schools of a whole county are under the control of county boards or school commissions. The district system was developed in New England after the scattering of the population, due to the cessation of the early Indian wars. It spread to the States of the West. Later, owing largely to the opposition of reformers like Horace Mann, who maintained that the district system meant insufficient support and inexpert supervision for the common schools, New England came to adopt the township system. The county system has been peculiar to the Southern States from the first, and to-day it exists also in some of the States of the Middle West, as in Indiana, Iowa, and Missouri, and in California and Washington of the Western States. The township system exists wholly or partially in 18 States and the district system in 33.

With the development of more elaborate school systems the supervision of the State became a more and more prominent feature. New York, in 1812, created a superintendent of common schools. This example was followed by others, and to-day there are State superintendents in all States. In most of them there is also a State board of education, which usually manages State school funds and either directly or indirectly determines the qualifications of teachers. For more minute supervision there is inspection either by a county superintendent or by the township or district committees. In 35 States the county supervision prevails. In New England the town school committees do the supervising. In addition, at least 1243 cities have superintendents for their public schools. The demand for greater uniformity and effectiveness in the schools as a whole has led not only to the creation of larger units for the control or supervision of schools, but also for the establishment of State funds and the levying of State taxes to supplement local contributions to the cause of education.

In the earlier Colonial period secondary instruction was given in what were called grammar schools. These institutions admitted children who had mastered merely the rudiments of English, and prepared them for college. The high schools were, however, preceded by academies. They were introduced into the United States as a substitute for both the grammar schools and the colleges. Many of these academies received, in addition to private endowments, large grants from the States. Some of them grew into colleges and later into universities. Academies for girls were established, and thus the way was paved for the higher education of women. The academies offered a somewhat wider and more liberal course of study than the older grammar schools and colleges, which were concerned mainly with the classics. In this way they led to the more liberal high schools and to the extension of the college curriculum.

The high school sprang up in response to a demand in the early part of the nineteenth century for the secularization and State control of secondary education. The English Classical School, later called the English High School, was founded in Boston in 1821. To-day a free public high school has to be maintained in every township in Massachusetts, and a number of high schools are State-aided. New York, Maryland, Wisconsin, Minnesota, California, and other States have elaborate State laws governing high schools. In a great number of States their creation and control are left to localities, the actions of which in the matter are not regulated by the State. They are found, however, in all important cities, and are springing up rapidly in nonurban areas.

The free elementary school may be said to exist in every locality of the United States, however sparsely inhabited. In the Western and Southern States the remoter districts are greatly helped by the contributions from the State funds, which are distributed in such a manner as to favor especially the smaller schools. The high schools, on the other hand, the existence of which is left almost universally to local initiative, are dependent largely on local support. Outlying districts are, in consequence, frequently without them, and when they exist there the territory that they supply includes ordinarily a number of elementary school districts. The consolidated high school has been found to be the only solution for such areas. Such divisions are either townships, as in New England, or counties, as in Maryland, the South, and occasionally in the West, or simply a convenient grouping of districts into what is called a union or consolidated high-school district. The board governing such schools is usually a specially created one, except where the township or county system prevails. In these cases, as with the district high school, the elementary and secondary schools are both managed by the same board.

The teachers in elementary schools, up to the time of the establishment of county and State supervision, were selected by the school boards at their discretion. To-day licenses or certificates are universally required before one can be elected to a teacher's position. In New England, however, these are granted by the school committees of the towns, and so teachers are licensed by the same board by which they are elected to office. Elsewhere throughout the Union the certification is in the hands of city or county superintendents or boards of education, or State superintendents or boards of education. Certificates of various grades are issued in the several States. High-school certificates are universally distinct from those for elementary teaching. All are granted either upon examination or upon credentials. Local certificates are valid only in the specific division where they are granted, but are frequently accepted as adequate credentials in other localities. State certificates are for longer periods, or even for life, while the local certificates expire after a few years. See NORMAL SCHOOL.

The ideal course of study in the modern primary school in the United States, as outlined by the Committee of Fifteen in 1894, includes reading, writing, spelling, composition, arithmetic, geography, simple lessons in natural science and general history, vocal music, drawing, with physical culture and manual training. In many schools such a programme exists, and in most an effort is made to approximate it. The greatest difficulty arises in the ungraded country schools, where a single teacher is called upon to teach children from 5 to 18 years of age, representing, of course, all or most of the grades of the elementary school. The ideal grammar-school course, as outlined by the same committee, in addition to the subjects of the primary grades, consists of English grammar, algebra, and United States history in the last two years, and either Latin, French, or German in the last year. Only in a few cases, however, are the foreign languages actually to be found in the grammar grades of the elementary school. For rural schools the last few years have seen the development of a great movement to introduce courses of study closely based on the needs of rural life. These are still in process of development. In general, the elementary-school curriculum has been subject to considerable criticism and more especially that part of it which affects the last two grades, the seventh and eighth. The criticism generally takes as its basis the fact that no preparation is given for the life activities which those pupils who leave school forever need, or that no attempt is made to provide some adjustment with the high schools. The first of these criticisms is leading to the development of general prevocational or industrial courses, the second to the reorganization of the high school in some places on a six-year plan beginning with the seventh grade, or the establishment of intermediate schools or junior high schools with three or four year courses beginning at the same period.

The course of study in the high schools is usually arranged with a view to presenting to the pupil from one to four different groups of subjects, any one of which he is at liberty to choose. The first of these groups constitutes the old classical course, but includes, besides Greek and Latin, modern languages or English, or both, algebra, geometry, and some history and natural science. What is commonly called the literary course drops the Greek and substitutes therefor more English, modern languages, or history. The scientific course drops Greek and sometimes Latin, laying stress on the sciences and mathematics instead. Another course, which emphasizes preparation for business and gives instruction in bookkeeping, stenography, typewriting, commercial arithmetic, and law and business methods, is frequently found. The tendency is, however, to hand over such a course to a commercial high school or business college. It is a favorite line of work for evening high schools. Practically all courses embrace algebra, geometry, civics, English, United States history, and physics. The sciences taught in the scientific course include chemistry and often botany and zoölogy. Courses in solid geometry, higher algebra, and trigonometry are often offered in high schools. No part of the educational system of the United States was more under fire during the period 1905–15 than the high school. The reasons can only be stated very briefly. It was felt that as compared with European secondary schools the achievements of the high school were smaller and the work was begun too late. The curriculum was also criticized as being planned almost entirely with a view to college entrance, with the result that those who did not intend to pursue a college career soon dropped out. Perhaps as a consequence of the first criticism, perhaps in order to make a better adjustment with the elementary grades, the "six and six" plan has been started, i.e., six years of elementary education and six years of secondary. The arrangement of the last six follows various plans, but generally the aim is to increase the variety of opportunity and to meet the needs of different groups of pupils, some of whom will remain only three years, some four, and others six. The following types of courses have been established: the general or cultural course, or college preparatory; the manual-training or industrial courses, leading to technical college or work in shops and trades; household-arts courses, preparing for the home or women's occupations; commercial courses; and agricultural courses. The function of the high school becomes increasingly not merely to train for life occupations, but by greater variety of opportunities to test capacity and develop tastes. The whole movement, however, is still in the experimental stage.

The high school is developing into an independent institution with its own aims and purposes, of which preparation for college is only one of many. The "accrediting" system, which prevails in Michigan and California, and by which high schools desiring to pass students without examination into the colleges are inspected by the faculties of the State universities, has been criticized for tending to reduce the high schools to mere feeders for the universities. On the other hand, it must be said that the colleges have very extensively modified and enlarged the curriculum of the old days of purely classical instruction, so that each of the courses offered in high schools, except perhaps the commercial one, prepares for some line of collegiate work. Moreover, the "accrediting" system has been the only system of effective inspection to which the high schools have been subjected, if we do not regard the college entrance examinations as attaining this end.

No effective system of pensioning teachers exists in the United States, although some laws have been passed aiming at this. They have relied, with few exceptions, on the contributions of teachers, and where they have been established new teachers are required to join in as part of the contract of appointment, the old teachers being given an option. On the other hand, the salaries of teachers in the elementary schools compare favorably with those abroad, averaging, in 1912, $78.08 a month for men and $58.08 for women for the country as a whole. The highest average salary for all teachers was $105.33 in California, the lowest $35.77 in North Carolina.

Forty-two of the States and the District of Columbia have compulsory-education laws. The common period during which some instruction must be given is from the eighth to the fourteenth year. These laws, though not rigidly enforced, are nevertheless fairly effective, and attendance for at least a good part of the year is now nearly universal for children of school age.

The evolution and present status of higher education in the United States, the most notable features of which have been the development of the State universities and the transformation of the colleges into universities, are dealt with in the article on UNIVERSITY. For a treatment of the American elementary schools, see the article on COMMON SCHOOLS.

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NATIONAL EDUCATION ASSOCIATION. See EDUCATION ASSOCIATION, NATIONAL.

NATIONAL FLAGS. National flags or ensigns date from a time long before Constantine adopted the monogram of Christ. (See LABARUM.) They are distinctly an evolution. In early days, as man emerged from the primitive state, the need of some tribal emblem made itself felt, and this was supplied by what afterward became the standard. Later on the religious element entered into the composition of flags and banners and coats of arms. See NATIONAL ARMS.

United States. The national flag of the United States of America is dealt with in a separate article under the title flag (q.v.). This is commonly called the "Stars and Stripes." The President's flag is blue, in the centre of which appears a representation of the arms of the United States in their proper colors. See NATIONAL ARMS and also HERALDRY.

The flag of the Vice President is white, and in the centre appear the arms of the United States, the colors being those of the coat of arms, with

slight modifications or minor changes in color necessitated by the white ground on which the coat of arms appears.

EUROPE

Austria-Hungary. The royal and Imperial standard of Austria-Hungary is a golden flag upon which appears a black two-headed eagle displayed, each head royally crowned, and above all the crown of Austria. The flag of the Austrian navy has three equal horizontal stripes—red on top, white in the middle, and red below. The centre of the flag bears the arms of Austria, the shield having a border of gold and surmounted with the crown of Austria. The flag of the merchant marine is like that of the navy except that the lowest band is red in the half next the flagstaff and green in the other, the reason being that the colors of Austria are red, white, and red, and those of Hungary red, white, and green. The merchant flag bears two crowned shields; the one next the staff is for Austria and the other for Hungary. The Hungarian crown is that of St. Stephen and is different from the crown of Austria.

Belgium. The naval and merchant-marine flags of Belgium are alike. The flag is composed of equal vertical stripes, black (next the staff), yellow, and red. The royal standard contains the royal coat of arms of the Kingdom, borne on the central yellow stripe.

Bulgaria. The national ensign or naval flag is a tricolor of horizontal bands—top white, centre green, and red at the bottom. In a space next to the flagstaff is the golden crowned lion rampant on a red ground. The merchant ships use the plain tricolor without the lion.

Denmark. The flag of Denmark is now the oldest unaltered one in the world. The royal arms have as their most striking feature the Dannebrog, or silver cross of Denmark, bordered with red. This cross divides the shield into four quarters, each of which is occupied by a separate device. The origin of the cross is said to date from 1219, when King Waldemar, at a critical moment in his career, averred that he had seen this cross in the heavens. The Dannebrog therefore became for him, as the name implies, the "Strength of Denmark." The flag of the navy is red, swallow-tailed, and has the white Dannebrog upon it. The flag of the merchant marine is a red flag with a white cross upon it and is not swallow-tailed.

France. The tricolor of France has been in official existence only since 1789, the year of the Revolution. Previous to that (and now called France Ancient) was a blue cloth powdered with golden fleurs-de-lis. In the reign of Charles V (1365) the number was reduced to three, typifying the Trinity (now called France Modern). When Henry III (1574) came to the throne, he adopted the *drapeau blanc* as the royal flag.

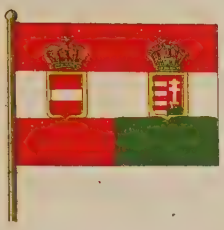
The tricolor, made up of three equal vertical bands of color—blue next the flagstaff, white in the centre, and red in the fly—now forms the national flag (called France Present). The flag is used by the navy and the merchant marine, as well as on shore by citizens generally. The President's flag carries his initials. When the civic guard was raised on July 14, 1789, it was decided that the colors should be blue and red, the colors of the city of Paris, to which, on the proposal of Lafayette, the white color of the royal Bourbon flag was added. The French tricolor of to-day is, as it were, a compromise flag, in which the colors of Paris are united with the former sovereign's color—white.

Germany. On the Imperial standard of Germany is laid the Iron Cross, black with a white and black border; at the centre of the cross is the German eagle, bearing on its breast the shield of Prussia, and this latter carries a quartered shield with the arms of the Hohenzollerns. The flag of the Imperial navy is white and divided into quarters by the arms of a large black cross having at its centre a circle in black outline containing the black Prussian eagle crowned. The upper quarter next the hoist contains the merchant flag in miniature, upon the centre of which is superimposed the Iron Cross. The merchant flag consists of three horizontal stripes equal in width, the upper being black, the middle white, and the lower red. These colors are derived from the black and white of Prussia and red and white, the colors of the Hanseatic League (q.v.).

Great Britain. The flag of the people in the British Empire is the Union Jack. It symbolizes the parliamentary union of the three constituent parts of the United Kingdom of Great Britain and Ireland. The Union Jack, or union flag, is composed of three crosses—St. George's, the broad upright Latin cross, red upon a white ground; St. Andrew's, saltire or X-shaped cross, white upon a blue ground; and the cross of St. Patrick, a red saltire on a white ground. The arrangement of the arm of the crosses next to the flagstaff is different from those remote from the staff. When James I of England and VI of Scotland united the crowns of those countries each had its own flag, and ships of each country continued to carry each its own colors. When the English and Scottish ships met at sea frequent contentions resulted as one or other hoisted its jack above that of the other. To put an end to these disagreements a flag combining the jacks was devised, and in 1606 a union flag was brought out. It is constructed by laying down the Scottish emblem and placing the English jack on top of it. The Scottish flag is blue, and where the red cross of St. George would touch the blue ground a narrow white border was interposed. The boundary between red and blue is never clear when viewed at a distance, and it is at variance with a rule of heraldry. In the reign of Anne the parliaments of England and Scotland were united, and the union flag was duly sanctioned, so that the flag of 1707 indicated the parliamentary union of the countries. In the jack of Anne the red St. George's cross had a wider border than the "additional jack of James" had, and thus indicated a portion of the original white ground of the English jack. In the year 1801 appeared the union flag as it is now flown. The Irish jack, a red saltire, or St. Patrick's cross, on a white ground, had to be incorporated to indicate the parliamentary union of Great Britain and Ireland.

In order properly to construct the Union Jack imagine a table twice as long as it is wide. The table, if entirely covered by a blue tablecloth, makes the ground for the jack. On this two diagonal lines are laid, and these lines intersect at the centre. Bands of white material are laid on the upper side of each of these diagonals at the left end of the table. At the point of intersection of the diagonals the white

MERCHANT FLAGS OF MARITIME COUNTRIES



AUSTRIA-HUNGARY

BELGIUM

DENMARK

FRANCE

GERMANY

GREAT BRITAIN

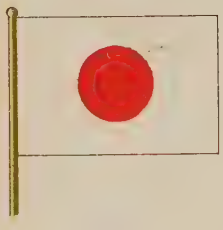
ITALY

MEXICO

RUSSIA

SPAIN

SWEDEN



JAPAN

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bands are cut and placed under the continuation of the same diagonals, the white bands going below the lines which lie on the right-hand end. The red Irish saltire, of the same width as that of the white St. Andrew's cross, is placed in the only space available, on the underside of both diagonals at the flagstaff end and above the diagonals at the right-hand end. As the two quarters next the flagstaff are more important from an heraldic point of view, here the St. Andrew's is above the St. Patrick's cross, thus indicating that Scotland came into the Union before Ireland. In order to avoid the touching of red and blue it is necessary to edge the red Irish saltire with white. The Irish cross is as wide as St. Andrew's, but the white border of the red saltire has to be cut off its own edge, although the red saltire with its border is equal to the full St. Andrew's cross of white. The red cross of St. George is then added. This, with its broad white border, is laid over the two saltires of Scotland and Ireland. The Union Jack is the proper flag for any British subject to use for private or public display. It typifies parliamentary union and is thus in every respect the people's flag.

The Union Jack is used by citizens all over the British Empire. When hoisted for the Governor-General of Canada, a white circular space at the intersection of the arms of the crosses is reserved for the badge. This circle is usually inclosed by a wreath of laurel leaves, when used by a colony, but in the case of Canada the wreath is of maple leaves; and ferns for New Zealand.

In Canada the badge consists of a quartered shield in which appear the arms 1, Ontario. 2, Quebec. 3, Nova Scotia. 4, New Brunswick. This is surmounted by the crown. The lieutenant governors, when using the Union Jack officially, place inside the wreath the arms of their particular province, but without the crown.

There is no distinctive flag for Canada, as the ensigns of the British Empire do not designate territory, they indicate class of service. The Union Jack is used by the people of Canada as in other portions of the British Empire. It is varied only by the Governor-General of the Dominion and by the lieutenant governors of the nine provinces of Canada. The Mercantile Marine flag flown by vessels of Canadian register is the Red Ensign of the Empire, with the badge of Canada (without crown or wreath) in the fly of the flag.

The British ensigns are three in number—the white, the blue, and the red. Each carries the jack in the upper left-hand corner next the staff. The white ensign is the flag of the royal navy. It bears the red cross of St. George in addition to that in the jack. The blue ensign is for all vessels in government employ. When employed by a colonial government the badge of the colony is in the fly. The blue ensign is also the flag of the Royal Naval Reserve. The red ensign is the flag of the merchant service.

For about 200 years the British navy was divided into three squadrons, called respectively the Red Squadron, the White Squadron, and the Blue Squadron. At the time of his death Nelson was vice admiral of the White, as shown on a monument in the Guildhall in London. As the various ensigns of these divisions of the royal navy were more or less difficult to distinguish in action, Nelson ordered the whole fleet to hoist the white ensign at Trafalgar on Oct. 21, 1805. These three divisions were abolished by order in council on July 9, 1864. A song written in America by an Englishman has been applied to Great Britain. Thus the song, "The Red, White, and Blue," perpetuates the memory of these three squadrons. It evidently does not refer only to the colors of a flag. The British ranking order is preserved. In the United States the reverse order prevails. It is thus probably commemorative of the disappearance as such of the red, the white, and the blue squadrons.

Greece. The flag of Greece is simple. The royal standard is a silver (white) cross on a blue ground. The royal shield is ensigned with the crown and placed at the intersection of the arms of the cross. Behind the shield are two sceptres. The flag of the navy contains a canton of blue upon which the white Greek cross stands on blue, and in the fly are nine horizontal bars, four white and five blue, the royal crown being shown in the intersection of the arms of the cross. The merchant flag is similar, but without the crown. The colors of the flag, white and blue, were derived from the arms of Otto of Bavaria, who was called to the throne of Greece in 1833. The motto of Greece, ΑΓΑΠΗ·ΛΑΟΥ· ΙΣΧΥΣ·ΜΟΥ, referring to the new King's choice by the people, reads, "My strength is my people's love."

Holland (The Netherlands). The national flag is a tricolor made up of three equal horizontal bands—red at the top, white centre, and blue below. The navy and mercantile flags are alike. Why the top stripe is red and not orange is not exactly known, though the original upper color was orange after William the Silent, Prince of Orange, had thrown off the Spanish yoke. In 1599 the flag was undoubtedly orange, white, and blue. Fournier, in 1643, wrote of it as red, white, and blue, and under these latter colors the victories of Van Tromp and De Reuter were gained.

Italy. The Italian flag dates back to 1310, when Amadeus V, Duke of Savoy, assisted the Knights of St. John of Jerusalem to victory over the Saracens at the siege of Rhodes. After the battle the Grand Master, in gratitude, presented Amadeus with the silver cross of the order. Amadeus placed it on a red shield with blue border in the arms of Savoy. In 1805 Napoleon made the northern provinces into a kingdom and gave it a tricolor, like that of France, but with the vertical colors green (next the flagstaff), white, and red. When Napoleon was overthrown this flag disappeared. It was revived in 1861 when Victor Emmanuel, King of Sardinia and a scion of the house of Savoy, became King of the southern portion of Italy. In 1870 the northern and southern parts were united as one Kingdom. The Savoy arms on the central white vertical band of Napoleon's tricolor became the flag of united Italy. The shield is crowned when used by the navy, but is plain for the merchant marine.

Monaco. Monaco has a white flag for the Prince, on which is a crowned shield, the field of which is covered with lozenge-shaped figures, red and silver. The collar of the Order of St. Charles, instituted in 1863, surrounds the shield, and the pendant is a Maltese cross. The naval flag is a plain red and white flag, two bands being horizontal, red on top. The merchant flag is the same.

Montenegro. Montenegro has a red flag with a white border, and in the centre are the royal arms crowned, being a double-headed eagle dis-

played, with sceptre and orb. The naval flag is a tricolor—from above red, blue, and white horizontal stripes. On the blue is a crown above the letters *H. I.* The merchant-marine flag is a tricolor with broad horizontal bands, like the ensign, but the crown and initials are not shown.

Norway. It was in 1397 that Sweden, Norway, and Denmark formed one kingdom under the sway of Denmark, but in 1414 Denmark released its hold. The naval ensign is a red flag, swallow-tailed, with a broad blue cross upon it. The cross has a narrow white border, and the fly end of the blue cross projects from the central angle of the swallowtail, as if a pennant had been laid on the flag. Norway achieved its independence in 1814. The merchant flag is red, with a blue cross edged with white. This flag is not swallow-tailed.

Portugal. In 1910 Portugal became a republic, though some memory of its history is retained in the flag. The arms of Portugal are a large silver shield on a green and red ground. On the shield are five small blue shields in the form of a cross, and each shield bears five plates of silver. The large shield has a red border, on which are seven golden castles. This device dates from 1139, when the country, which had been in subjection to the Moors for 500 years, threw off the yoke. Alphonso I defeated five Moorish princes in the battle of Ourique and adopted five small shields to commemorate the victory. The five white spots represent the five wounds of Christ, in whose strength Alphonso believed he had defeated the infidels. The red border was added by Alphonso III in 1252 after his marriage to a daughter of the King of Castile. In the flag this shield is placed upon an armillary circle of gold. The colors of Portugal are green and red, and the national emblem shows the flag divided vertically and equally. It is square, with green next the flagstaff; red is the color for the Republic. John I of Portugal was the father of Prince Henry the Navigator (1415–99). Prince Henry achieved knighthood, and the green is that of the cross and ribbon of the Knights of St. Benedict of Aviz and, with the armillary circle, commemorates Prince Henry's fame. The national ensign is a green and red flag. The proportion of green to red is as 2 to 3. The shield is placed in the centre of the dividing line. The merchant flag is entirely green, with the shield and armillary circle in the centre.

Rumania. Rumania has a tricolor with vertical bands—blue next the flagstaff, yellow centre, and red in the fly. The yellow band contains the arms within a crowned canopy of ermine, which is the quartered shield of the state with supporters. The motto *Nihil sine Deo* (Nothing without God) is below the shield on a black ribbon. The naval ensign contains these arms, while the merchant flag is plain.

Russia. The introduction of the two-headed eagle for Russia dates from 1472, when Ivan the Great married Sophia, a daughter of Constantine Palæologus, and assumed the arms of the Greek Empire. The naval flag is white with a blue St. Andrew's cross upon it. The jack of the navy is made by placing the narrow white cross of St. George on a red ground, and over all the white-bordered blue cross of St. Andrew. This flag resembles the "additional jack of James," except that the colors are different from those of the British jack. The merchant flag is a tricolor of three equal horizontal bands —white on top, blue in the middle, and red below. These colors were originally red, white, and blue. Peter the Great derived them from the Dutch, from whom he learned shipbuilding. This form was the Dutch flag reversed, which is the signal of distress for Holland, and was later altered.

Servia. The merchant flag of Servia is a tricolor of broad horizontal stripes—red above, blue centre, and white below. The royal standard has a crowned canopy of ermine containing a crowned shield and supporters. The shield shows a double-headed eagle displayed, upon whose breast is a red shield containing an upright cross with the date 1804. Each quarter made by the arms of the cross contains a Slav initial letter. The standard has an indented border, the colors are white, red, and blue. The merchant flag is usually a plain tricolor, but sometimes it has the arms inserted.

Spain. The flag of the navy is yellow, the color of Aragon, having on the upper and lower edges a wide stripe of red, the color of Castile. On the broad yellow stripe an oval shield crowned is shown near the flagstaff, on which are the arms of Castile impaling Leon. The merchant-marine flag is a yellow flag upon which two red stripes are laid some distance in from the edge so that the flag is composed of five horizontal stripes—yellow, red, yellow (broad, central), red, and yellow. The crown and shield of Castile and Leon do not appear on this flag.

Sweden. Sweden has for a naval ensign a blue flag upon which is a yellow cross. The flag is swallow-tailed, and the horizontal arm of the cross in the fly projects. The merchant flag is the same as the ensign with the exception of the swallowtail, the merchant flag being rectangular.

Switzerland. The flag of Switzerland is red with a white cross upon its centre. The arms of the cross do not extend to the outer edges of the flag. The national and merchant flags are one and the same. In 1863 an international conference was held at Geneva, in which the rules of war were discussed and field and permanent hospitals, ambulance service, and the many humane methods of caring for the wounded were officially recognized by the signatory powers. A badge was devised as the distinguishing mark of this work. It was the flag of Switzerland with the colors counterchanged, making it a red cross on a white ground.

Turkey. The naval and merchant flags of Turkey are alike and are light red, on which are superimposed a crescent and a star in silver. The crescent moon is near the flagstaff and the star remote from it. The crescent was made the emblem of Byzantium after the siege of that city by Philip, father of Alexander the Great. A night attempt by the followers of Philip to undermine the walls of the city was revealed by the light of the crescent moon. In gratitude for this delivery Diana's symbol became the badge of the city. In 1453 Mahomet II captured the city and adopted the badge for the Ottoman Empire.

ASIA

China. Since China became a republic, in 1912, the flags formerly used have been discarded. The national flag, used also in the merchant service, consists of five broad horizon-

MERCHANT FLAGS OF MARITIME COUNTRIES

ARGENTINE REPUBLIC

BRAZIL

CHILE

CHINA

COSTA RICA

ECUADOR

GREECE

NETHERLANDS

NORWAY

PORTUGAL

PERU

VENEZUELA

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tal bands of color, the uppermost, red, standing for China proper; the next, yellow, for Manchuria; the next, blue, for Mongolia; beneath that is white, for Tibet; and lowest of all is black, for Turkestan. The flag of the navy is red with a blue canton in the upper corner next the hoist, and upon this is a large white sun, from which emanate rays in the form of small triangles. The colors thus employed in the naval flag stand for Mongolia, Tibet, and China proper.

Federated Malay States. The Federated Malay States (Pahang, Perak, Negri Sembilan, and Selangor) have a flag of four horizontal bands of color. Beginning at the top they are white, red, yellow, and black. In the centre of the flag is a horizontal oval of white, on which a tiger is shown in its natural colors on a green grass ground.

Japan. The flag of the Mikado of Japan, which corresponds to the royal standard of European countries, is a red rectangular flag upon which appears in the centre a golden conventional representation of the yellow chrysanthemum. The naval flag is white, with a red disk, representing the sun, placed slightly out of the centre and nearer the flagstaff. From this disk broad fan-shaped bands of red color radiate like the rays of the rising sun. The flag of the merchant marine is white with a red circle in the centre. The present flags were adopted in 1897.

Persia. The Imperial standard of Persia is a blue flag with a white circle in the centre, on which appear the arms of Persia. The military flag, there being no naval ensign, is a horizontal tricolor—green above, white central, and red below. Upon the centre of this flag are the arms of Persia, similar to those on the Imperial standard, but not inclosed in a white circle.

Siam. The standard of Siam is a red flag upon which appear the royal device, a white elephant with trappings and harness, standing on a platform, and in the upper corner next the hoist an anchor and a wheel. The merchant flag has the white elephant only, without trappings or platform, and without wheel and anchor. The origin of this white elephant is said to be that before Xacca, the founder of Siam, was born his mother dreamed that she brought forth a white elephant, and the Brahmans said that after many incarnations Xacca became a white elephant and was received among the celestial deities.

AFRICA

Abyssinia. The national ensign is the tricolor, the colors from the top being green, yellow, red, without any device.

Belgian Congo. Belgian Congo has a blue flag carrying in the centre a five-rayed golden star and showing the Belgian ensign in the canton.

Liberia. The national ensign has 11 horizontal stripes, red and white, with a large white star in a blue canton next the flagstaff in the upper corner. The naval and merchant flags are alike.

SOUTH AND CENTRAL AMERICA

Argentina. The flag of Argentina has three bands placed horizontally. At the top is blue, centre white, bottom blue. For the naval flag the sun in splendor is shown on the central white band.

Bolivia. Bolivia has a tricolor with horizontal stripes. Red is uppermost, yellow in the middle, and green below. For the naval flag the arms of the state are introduced in the centre of the yellow stripe, while the merchant flag is plain.

Brazil. Brazil has a green flag, in the centre of which is a large yellow lozenge with major axis horizontal. On the lozenge is a disk of blue, on which appears a representation of one of the heavenly constellations, and upon this sphere is a band inscribed with the motto *Ordem e progresso* (Order and progress).

Chile. The national ensign and merchant flag of Chile is composed of two equally wide horizontal stripes, white above and red below, with a canton next the flagstaff blue, and bearing a white five-rayed star.

Colombia. The flag of Colombia has at the top a broad, yellow, horizontal stripe occupying half the flag, below which is a light-blue stripe and then a red one. The merchant-marine flag has at the centre an upright red oval inclosing a blue ground on which there is a white star. The naval flag has the state arms in the centre of the flag.

Costa Rica. The national flag is made of five horizontal stripes of color. The top is blue, below white. The central band is red, broader than the others. Below this is white, and lowest is blue. The naval flag shows the arms of the state on the centre of the broad red stripe, while the merchant flag is plain.

Cuba. Cuba has a blue and white arrangement of horizontal stripes, three blue and two white. Next the flagstaff is a triangle with base to the hoist and point in the central blue stripe. The triangle is red, with one white star upon it.

Dominican Republic. The flag of the Dominican Republic has a white upright cross upon it. The upper quarter of the flag next the staff is blue, the corresponding top quarter remote from the staff is red. The lower quarter next the staff is red, and the remaining one is blue. The merchant flag is plain, while the naval flag has the national device shown at the intersection of the arms of the cross.

Ecuador. Ecuador's flag has broad yellow in the upper half of the flag, blue below, and red beneath; the two lower stripes are each one-quarter of the hoist measurement. The national ensign has the state arms in the centre of the flag, while the merchant flag is plain.

Guatemala. The flag of Guatemala is blue, white, and blue, arranged in three broad vertical bands. The state arms occupy the centre of the white band, and upon a scroll under the arms are the words *Libertad 15 de Setiembre 1821.* The merchant flag is without the national device.

Haiti. The merchant flag is plain blue and red in horizontal stripes, the blue above. The naval ensign shows the national badge on a rectangle of white at the centre of the flag.

Honduras. Honduras has the same colors in the national flag as those of Guatemala, but they are arranged horizontally—blue on top, white central, and blue below. The ensign has the national badge in the centre and five gold stars below it. The merchant flag shows five gold stars in the centre of the white stripe.

Mexico. Mexico has a tricolor of vertical stripes. The stripe next the flagstaff is green, the outer one is red. The central stripe is

white, with the badge of the Republic shown upon it for the naval flag. The merchant flag is plain.

Nicaragua. The flag is blue, white, and blue, arranged horizontally, with the arms of the state shown in the central white stripe when used for warships. The merchant flags have a blue anchor instead of the national arms.

Panama. The national ensign is a quartered flag. Next the flagstaff in the upper corner is a blue star on a white ground. The upper quarter remote from the staff is plain red. The lower quarter next the staff is plain blue, while the outer and lower quarter has a red star on a white ground.

Paraguay. Paraguay has a horizontally arranged tricolor of red, white, and blue—red on top and blue below, with the white central band containing in its centre the arms of the state. The ensign has a lion standing, surrounded by a wreath, and above all is a red Phrygian cap carried on a pole. It has a reverse badge on the other side of the flag, different from that on the front; both, however, are oval. The merchant flag is like the ensign except that the badge is different from that on the ensign, being circular in form. Both sides of the merchant flag are alike.

Peru. The President's flag and the ensign of Peru is a vertical tricolor, red, white, and red. The arms of the state appear in the centre of the white band. The merchant flag has the same arrangement of colors, but the state arms are absent.

Salvador. Salvador's ensign is composed of three horizontal stripes—blue above and below and white central. In the centre of the white band are shown the arms of the state, with the words in Spanish *Republic of Salvador and Central America.* The merchant flag is the same as the ensign, but on the centre of the white band are the words in golden letters, *Dios—Union—Libertad,* arranged in a circle without the arms of the state.

Uruguay. Uruguay has a flag composed of horizontal stripes, alternately white and blue, there being five white and four blue. On a white canton there is the golden sun in splendor.

Venezuela. The naval flag is a tricolor with horizontal bands—yellow on top, blue centre, and red below. The arms of the state are placed on the yellow stripe, in the upper corner next the flagstaff. The centre of the flag is occupied by seven white stars arranged in a group. The merchant flag is like the ensign, with the arms of the state omitted, but the seven stars appear.

Bibliography. Charles Boutell, *Heraldry, Historical and Popular* (3d ed., London, 1864); W. H. Whitmore, *The Elements of Heraldry* (New York, 1866); G. H. Preble, *History of the Flag of the United States of America* (3d ed., Boston, 1882); J. H. Lawrence-Archer, *The Orders of Chivalry* (London, 1887); British Admiralty, *Drawings of the Flags in Use at the Present Time (1889)* (ib., 1889); John Woodward, *Heraldry, British and Foreign* (ib., 1896); F. E. Hulme, *Flags of the World* (New York, 1897); Moritz Ruhl, *Flaggenbuch* (Leipzig, 1905); A. C. Fox-Davies, *Complete Guide to Heraldry* (London, 1909); C. H. Ashdown, *British and Foreign Arms and Armour* (ib., 1909); *The American Flag,* published by the New York State Board of Education (Albany, 1910); *Book of the Knowledge of all the Kingdoms, Lands, and Lordships that are in the World, and the Arms and Devices of Each Land and Lordship,* translated and edited by Sir Clements Markham for the Hakluyt Society (London, 1912); P. D. Harrison, *Stars and Stripes and Other American Flags, Including their Origin and History* (5th ed., Boston, 1914); United States Quartermaster Corps, *Illustrations of Bunting, Flags, Colors, Standards, etc.* (Washington, 1914); United States Navy, Bureau of Equipment, *Flags of Maritime Nations* (ib., 1914); W. J. Gordon, *Flags of the World, Past and Present* (London, 1915). See COLORS, MILITARY AND NAVAL; ENSIGN; FLAG; HERALDRY; NATIONAL ARMS.

NATIONAL FLOWERS. See FLOWERS, NATIONAL AND SYMBOLIC.

NATIONAL FORESTS. See LUMBER INDUSTRY; FORESTRY.

NATIONAL FORMULARY, OF UNOFFICIAL PREPARATIONS. A book of medicinal formulæ which are frequently prescribed by physicians or demanded by the public, but which are not recognized by the *Pharmacopœia* (q.v.), either because they were not thought of sufficient importance or because they originated subsequently to the last edition of the official work. The *National Formulary* is compiled by a committee of the American Pharmaceutical Association and published by the society, based upon a similar work prepared in 1882 by the College of Pharmacy of the City of New York, the King's County Pharmaceutical Society, and the German Apothecaries Society of the City of New York. The first edition appeared in 1888, the second in 1896, and the present, the third, in 1906, always following the appearance of the last edition of the *Pharmacopœia.* It contains about 600 preparations, with an appendix of about 75 more which had been dismissed from the *Pharmacopœia* of 1890 and 1900.

NATIONAL GALLERY. The term National is often applied to galleries and museums belonging to the state. Thus, there are important national museums at Naples, Florence, Munich, Stockholm, and Copenhagen. The best-known collections bearing the title National Gallery are: one at Washington devoted chiefly to American painting; another at Berlin, devoted chiefly to modern German painting; and the important gallery of painting in London, situated on the north side of Trafalgar Square. The building, in classical Greek style, was erected from designs by Wilkins between 1832 and 1838 and originally cost £96,000. It was enlarged in 1860, 1876, and 1886. The gallery, formed in 1824, rapidly increased in size and received important collections of paintings, presented or bequeathed by Robert Vernon in 1847, J. M. W. Turner in 1856, Wynn Ellis in 1876, Henry Vaughan in 1900, and George Galting in 1910. It has besides received important financial bequests and state aid. The National Gallery is particularly rich in the paintings of the Italian school, including magnificent examples by Crivelli, Piero della Francesco, Giovanni Bellini, Titian, Moroni, and Raphael's Ansidei Madonna; but the early Flemish and Dutch schools (with several fine Rembrandts), and especially the old English masters, are also well represented. The modern British sculptures and paintings are housed in the National Gallery of British Art (Tate Gallery), a branch of the National Gallery, provided by the late Sir Henry Tate (q.v.); and British portraits in

the National Portrait Gallery, founded in 1850. The national collections now embrace 1880 works of art, most of which are in the National Gallery. Consult: J. P. Richter, *Lectures on the National Gallery* (New York, 1898); J. de W. Addison, *Art of the National Gallery* (Boston, 1906); P. G. Konody and others, *National Gallery* (2 vols., New York, 1909).

NATIONAL GUARD (Fr. *Garde Nationale*). From 1789 to 1871 the name of the French militia under municipal control, recruited from the middle class. The French Revolution really brought about the creation of the National Guard, though guards of a like nature had existed in some towns previous to 1789. In that year, however, they were instituted in Paris, on the suggestion of Mirabeau, by the Revolutionary Committee, as a check on the Royalists. The National Guard thus constituted numbered 48,000 men, and Lafayette received the command. Other battalions were organized in the provinces, and very soon, on paper, the total strength of the National Guard of France was 4,000,000—though the actual available force was not more than 300,000. In 1795, after the National Guard had gone through many of the most eventful scenes of the Revolution, it was reorganized on a less democratic basis. The result was that it showed Royalist leanings and became the bulwark of the middle classes against uprisings of the masses. It rose against the Convention shortly before the dissolution of that body, but the movement was promptly suppressed by Bonaparte with grape shot. This was the insurrection of the 13th Vendémiaire (October 5). For a time the National Guard ceased practically to exist. In 1805, however, the Emperor Napoleon reorganized it, and it rendered him good and efficient service, particularly in the disastrous years 1813–14. After 1815 the National Guard was still maintained, but in 1827 it was dissolved by Charles X. Its members were allowed, however, to retain their arms, and many of them participated in the July revolution of 1830, at which time the National Guard as an institution was revived. In 1848 it helped do away with the monarchy and establish the Republic. After undergoing various reorganizations in 1848, 1852, and 1855 it again became firmly established. The National Guard fought in the Franco-Prussian War in 1870, and at the capitulation of Paris its members were allowed to retain their arms. The result was that during the Commune of 1871 numbers of national guardsmen went over to the Communists. (See COMMUNE.) After the establishment of the third French Republic the National Guard was abolished, its place being taken by the system of universal military conscription. Consult C. Poisson, *L'Armée et la garde nationale* (4 vols., Paris, 1858–62), and Thoumas, *Les anciennes armées françaises des origines à 1870* (ib., 1890). For the National Guard of the United States, see MILITIA.

NATIONAL HYMNS. It is only within comparatively modern times that patriotism has found expression through the medium of a *national* song. In the few cases where a national hymn dates back several hundred years it will be found to have assumed its representative character recently. National music is inseparably connected with folk music (q.v.), but is a later development, and instead of representing the work of individuals (influenced by similar conditions and surroundings) it embodies the feelings, tendencies, and ideas of a people. In other words, folk music is individual in its character rather than national. Needless to say, however, it is the forerunner and basis of national music, which often reaches its culmination in the national hymn. The following list of national hymns covers the most important ones. It is compiled largely from Sousa's *Airs of All Lands* (Philadelphia, 1890).

Argentine Republic—"Oíd, mortales, el grito sagrado" (1810) (Hear, O Mortals, the Sacred Call). Music by D. V. Lopez.

Austria—"Gott erhalte Franz den Kaiser" (1797). Words by L. L. Haschka; music by J. Haydn.

Belgium—"La Brabançonne" (1830). Words by Jenneval; music by F. Campenhout.

Bohemia—"War Song of the Hussites."

Brazil—"Hymno da Proclamacão da Republica" (1889) (Hymn of the Proclamation of the Republic). Words by Medeiros e Albuquerque; music by Leopoldo Miguez.

Burma—"Kayah Than" (Sound the Trumpet).

Chile—"Dulce Patria" (national air); by Carnicer.

Costa Rica—"De la Patria." Music by M. M. Gutierrez.

Denmark—"King Kristian stod ved höien Mast" (King Christian Stood beside the Mast). Words by Ewald; music by Hartman.

Ecuador—"Salve, O Patria."

Egypt—"Salaam, Effendina" (March of the Khedive).

Finland—"Vårt land" (Our Land). Words by J. L. Runeberg; music by F. Pacius.

France—"La Marseillaise" (q.v.). Words and music by Rouget de Lisle.

Germany—"Heil dir im Siegerkranz." Words by H. Harries to music of "God Save the King" (q.v.).

Great Britain—"God Save the King" (q.v.).

Holland—"Wien Nêerlands."

Hungary—"Isten áld meg a Magyart" (Lord Bless the Hungarian). Music by F. Erkel.

Italy—"Royal March" (national air); by G. Gabetti.

Japan—"Keenêê gajo" (May the Empire Last).

Mexico—"Mexicanos, al grito de guerra" (national air) (Mexicans, at the Cry of War); by J. Nunó.

Nicaragua—National air, by Blas Villatas.

Norway—"Ja vi elsker dette Landet" (Yes, we Love this Land of ours). Words by Björnstjerne Björnson; music by R. Nordraak.

Persia—"Salamati Shah." Music by A. Lemaire.

Peru—"Somos libres, seámoslo siempre" (We are Free; let us be so Ever).

Rumania—"Traeasca Regale" (1862) (Long Live the King).

Russia—"Boghe Zaria chrany" (1830) (God Protect the Czar). Words by Zhukovsky; music by A. Lyoff.

Salvador—"Saludemos la Patria" (Let us Hail our Country). Words by J. J. Canas; music by J. Aberle.

Servia—"God in His Goodness." Music by D. Jenko.

Spain—"Himno de Riego." Music by Herta.

Sweden—"Ur svenska hjertans djup" (Out of the Swedish Heart).

Switzerland—"Rufst du, mein Vaterland," to music of "God Save the King."

United States—"Star-Spangled Banner."

Uruguay—"Himmo Nacional de la República Oriental del Uruguay."

Venezuela—"Gloria al bravo pueblo" (1811) (Honor to a Brave Nation). Words by V. Salias; music by J. Sandaeta.

Consult: Carl Engel, *An Introduction to the Study of National Music* (London, 1866); Fitzgerald, *Stories of Famous Songs* (ib., 1898); Rousseau and Montorgueil, *Les chants nationaux de tous les pays* (Paris, 1901); Emil Bohn, *Die Nationalhymnen der europäischen Völker* (Breslau, 1908); H. F. Chorley, *The National Music of the World* (London, 1912).

NATIONAL INSTITUTE OF ARTS AND LETTERS. (See ACADEMY OF ARTS AND LETTERS, AMERICAN.) These two organizations received jointly in 1915 the site for a permanent home. It was given by Archer M. Huntington and adjoins the property in New York City which the same donor provided for the American Geographical Society and the Hispanic Society.

NA'TIONALISM. A term applied to the plan of social reform outlined in Bellamy's *Looking Backward*. The scheme involved the nationalization of the processes of production and distribution. It is a form of socialism which emphasizes the social importance of economic equality.

The first Nationalistic Association was organized by a company of Bellamy's readers in Boston in 1889. A statement of its views condemned the system of competition and expressed the belief that it would gradually be supplanted by a system of universal brotherhood. The movement spread rapidly, and by 1891 there were in the United States 162 clubs. In some States, notably California, an active part was taken in politics. In May, 1889, was started a magazine, the *Nationalist*, which existed two years. Its place was then taken by the *New Nation*, founded by Bellamy, which also lasted two years. The Nationalists exercised a considerable influence upon the People's party, but did not play any considerable independent rôle. The movement spread to England, where the Nationalization Society was organized July 3, 1890. See SOCIALISM.

Consult: Edward Bellamy, "The Programme of the Nationalists," in the *Forum* (New York, March, 1894); R. T. Ely, *Socialism and Social Reform* (New York, 1894); Edward Bellamy, *Looking Backward* (new ed., Boston, 1898).

NATIONALISM. A modern historical tendency having for its objective the organization in well-knit political states of populations naturally bound together by ties of nationality. Nationality itself is conceived by the proponents of the tendency as including community of language, traditions, morals, religion, and, in a broad sense, culture (*Kultur*). In the early period of nationalism much stress was laid also upon community of race, but more recent ethnological studies have rendered the hypothesis of race as a basis of culture untenable.

In its modern form nationalism is an outgrowth of the French Revolution, with its emphasis upon the independence and unlimited sovereignty of nations. Before the Revolution England and France were indeed national states, the political organization being coterminous with the cultural; but nationalism had not assumed the form of a conscious force. Conscious nationalism developed in France in her struggle with hostile coalitions. The ideal was taken up by German statesmen, philosophers, and poets during the revolutionary period, and made steady progress, despite the obstacles of particularism, or the sentiment of state autonomy, finally reaching its culmination in the formation of the German Empire, under the statesmanship of Bismarck, in 1871. A similar movement appeared in Italy in the second decade of the nineteenth century, resulting, after a half century of revolutionary activity, in the creation of a united Italy in 1861. The national movement in Greece, originating about the opening of the nineteenth century, was crowned in 1830 by the establishment of Greece as an independent kingdom, though most of the territories inhabited by Greeks remained under Turkish rule. Nationalism in the Balkans, awakened not much later, led to a series of revolts, with resulting experiments in autonomy, and finally the recognition of the independence of Rumania, Bulgaria, Servia, and Montenegro, under the Treaty of Berlin. Norwegian independence (1905) and the creation of an independent Albania in 1913 may be regarded as outgrowths of the nationalism movement, although in the latter case the condition of independence was imposed by the diplomacy of the Great Powers instead of arising out of a spontaneous popular movement.

While nationalism achieved its final purpose in the instances cited, it has failed of its object despite active movements, often accompanied by insurrection, in the cases of Hungary, Bohemia, Poland, Finland, and Ireland. Abortive nationalist movements have also made their appearance in India, Egypt, and the Philippine Islands. Further, even in cases in which a part of a nation has achieved political organization, other parts have remained under foreign rule. Familiar examples of national fragments under alien domination are Alsace-Lorraine under Germany, the Italian-speaking territories of the Trentino and Istria under Austria-Hungary, Bosnia and Herzegovina—largely inhabited by Servians—under Austria-Hungary, and, down to the Balkan wars, the Greek, Servian, and Bulgarian sections of Macedonia, and Thrace under Turkish rule. In each case an active movement (Irredentism) has been conducted in such "unredeemed" territories for annexation to the state representing the national unity. In reaction against Irredentism the states dominating such territory have pursued policies of forced assimilation through the imposition of their language as a medium of public instruction, official business, etc.

Nationalism was the chief cause of military conflicts in the nineteenth century. In addition to the revolutionary struggles inherent in the movement and the wars created by Irredentist agitation, nationalism has in some instances favored foreign war as a force making for domestic unity. This was notably the case with the Franco-German War of 1870, which was regarded as desirable by German statesmen on account of its effect in sinking local jealousies in a vital common cause.

In the United States nationalism as a movement had for its object the subordination of the States to the central government. This object came near to realization in the Constitution; the residual element of State sovereignty was in large measure extinguished by the Civil War. In recent years an attempt has been made to intensify the nationalism tendency through the inauguration of economic policies designed to

give the Federal government a more positive rôle in industrial and social development. This movement, which is represented especially by a section of the Progressive party, has been somewhat vaguely characterized as the "new nationalism." (See NEW FREEDOM.) The new nationalism derives much of its force from the example of German nationalism, which has developed the relations between the state and industry with remarkable success. See SOCIALISM, *State Socialism*.

Nationalism does not imply a self-contained economic policy; on the contrary, it regards the foreign trade and investment relations of citizens as particularly deserving the solicitude of the state; hence an active interest in the export trade, often supported by subsidies, measures designed to further shipbuilding, commercial treaties, and, on occasion, acquisition of colonies. (See IMPERIALISM.) It seeks to put barriers in the way of emigration and to place restrictions upon aliens doing business in the home market. In this respect it is sharply to be contrasted with the cosmopolitan tendencies of nineteenth-century liberalism.

NA'TIONAL'ITY. The condition or status of belonging to a nation or sovereign state. A person so related to a state, as citizen, subject, or national, owes allegiance to such state and is entitled to its protection at home and abroad. Every person is born a national of some state, but, as each country defines for itself by its municipal law what circumstances of birth determine its nationality, considerable divergencies exist. The one universal rule is that a person born in a country of parents who are subjects or citizens of that country is himself a citizen or subject thereof. But the status of a person born of alien parents or of one born in a foreign land varies in different countries. In some countries the locality of birth, irrespective of parentage, is the determining factor; in others the nationality of the parents determines that of the child wherever born; and there is a marked tendency at the present time to employ both principles, so that every person born within a country and in addition every person born abroad of subjects of such country is ipso facto a subject or national thereof.

Great Britain and the United States confer the status of citizens or subjects both on the children of aliens born within their respective dominions and on the children of their own citizens born abroad. Most European states rely on the principle of nationality of the parents and claim no allegiance from the children of aliens who may be born within their territory, but by laws enacted in 1889 and 1893 France claims as her citizens children born on her soil if one of the parents is a French citizen. It is obvious that the combination of the two principles of nationality of parents and locality of birth will often have the curious result of conferring on one and the same person a double nationality. Thus, a child born in the United States of English parents is at the same time a British subject and an American citizen. This difficulty is partially met by the laws of several countries which give to a person with a double nationality the right to disclaim or renounce one of them on attaining his majority.

The nationality acquired by birth may be lost through the acquisition of another nationality by naturalization. Most countries make provision by law for the naturalization of resident aliens, who by that process usually acquire full citizenship, though not necessarily all the political rights of natural-born citizens. The law governing naturalization usually requires the applicant for citizenship to renounce his allegiance to the sovereign or government of the country of which he was at the time a citizen, but it is clear that such renunciation can have no legal effect outside the naturalizing state unless the new status is recognized by the state whose allegiance is renounced.

The maxim that no one can renounce his nationality (*Nemo protest exuere patriam*) is the common law of all modern states and was English law up to the year 1870, when by Act of Parliament (The Naturalization Act, 33 and 34 Vict., c. 14) it became possible for a British subject on acquiring a foreign nationality to renounce his British nationality, and this principle was after much conflict of opinion adopted by the United States in 1868 by an Act of Congress which declares that "the right of expatriation is a natural and inherent right of all people." By a series of naturalization treaties concluded between 1868 and 1902, most foreign states accepted the principle that naturalization in the United States absolved their subjects from their former nationality. Russia, however, still regards as her own nationals all of her subjects who have been naturalized in other countries, and some other states, like Italy, regard such subjects as still liable to military service or as punishable with death if they bear arms against their native country. An American citizen may also forfeit his nationality, if a naturalized citizen, by returning to the country of his former allegiance and residing there for two years or by residing in any other foreign country for a period of five years, unless it be as a representative of American trade or commerce or for purposes of health or education, and unless he intends to return permanently to the United States to reside (Act of Congress, March 2, 1907), and even a natural-born citizen forfeits his American citizenship by leaving the United States and establishing himself in a foreign country without any definite intention to return to the United States.

The foregoing rules with regard to citizenship and naturalization apply to women as well as to men, with the exceptions that an alien woman who marries an American citizen thereby acquires the status of her husband and that an American woman who marries an alien, whether resident in this country or abroad, by that act loses her American citizenship. It was also provided by the Act of 1907, previously referred to, that the citizenship of an alien wife acquired by marriage is not lost by the death or divorce of her husband, and that the American wife of an alien husband may after his death or after divorce resume her American citizenship either by residing in the United States or, if living abroad, by registering as an American citizen within one year with a consul of the United States.

The doctrines of nationality above set forth are a part of the municipal, or domestic, law of the various nations, and do not trench upon international law except in those cases where, by treaty or otherwise, the right of a person by naturalization to renounce a former nationality comes into question. But international law recognizes the right of a state to the allegiance

of all the subjects of a conquered territory or of territory acquired by cession, occupation, or discovery. Thus, the citizens of Alsace and Lorraine were by the Treaty of Frankfort, which brought the Franco-German War of 1870–71 to a close, transferred from French to German nationality. The modern practice of nations has in such cases permitted the citizen or subject inhabitants of such a territory to elect whether they would remain as nationals of the new sovereign or remove to other territory of their former allegiance.

Bibliography. Cockburn, *Nationality* (London, 1869); W. E. Hall, *Foreign Powers and Jurisdiction of the British Crown* (ib., 1894); J. B. Moore, *Digest of International Law* (8 vols., Washington, 1906); Piggott, *Nationality* (London, 1907); T. J. Lawrence, *The Principles of International Law* (4th ed., Boston, 1910); W. E. Hall, *Treatise on International Law* (6th ed., Oxford, 1910); John Westlake, *International Law* (2 vols., New York, 1910–11). See CITIZEN; DOMICILE; JURISDICTION; NATURALIZATION.

NATIONAL LITERARY SOCIETY OF IRELAND. See IRISH LITERARY SOCIETY.

NATIONAL MONUMENTS. National monuments are reservations that have been established by proclamation of the President in accordance with the Act of June 8, 1906, which provides that he may in his discretion "declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic and scenic interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and may reserve as parts thereof parcels of land." The same act authorizes the Secretaries of the Interior, Agriculture, and War to make uniform regulations governing the excavation of ruins and archæological sites and the collection of objects of antiquity by public institutions. Uniform regulations were published on Dec. 28, 1906, and each Secretary issues permits for excavations in the monuments within his jurisdiction.

National monuments are not essentially different from national parks except in methods of establishment and administration. The monuments are as a rule smaller than the national parks. Congress has provided neither funds nor administrative machinery for protecting the lands reserved as monuments. They have consequently been placed under the charge of the nearest administrative officer of one of the three departments. In the list below the area of each monument and the date of establishment are given in parentheses.

The following monuments are under the supervision of the Secretary of the Interior: Natural Bridges, Utah (2740 acres, April 16, 1908, and Sept. 25, 1909), includes the three largest natural bridges known; the Augusta Bridge, the largest, measures 320 feet from wall to wall and has below it a clear opening of 265 feet. Rainbow Bridge, Utah (160 acres, May 30, 1910), includes a natural bridge that has a curved surface above as well as below; it has a height of 309 feet and a span of 278 feet. El Morro, New Mexico (160 acres, Dec. 8, 1906), includes an enormous sandstone rock on which the Spanish explorers of the seventeenth and eighteenth centuries carved many inscriptions that are of historical importance. Muir Woods, California (295 acres, Jan. 9, 1908), is near the city of San Francisco and includes a fine redwood grove which was presented to the United States by William Kent. Petrified Forest, Arizona (25,625 acres, July 31, 1911), includes a large area in which the prostrate trunks of petrified trees are exposed on the surface. Devil's Tower, Wyoming (1152 acres, Sept. 24, 1906), is a steep-sided shaft of rock 600 feet in height. Montezuma Castle, Arizona (160 acres, Dec. 8, 1906), includes an assemblage of cliff dwellings. Tumacacori, Arizona (10 acres, Sept. 15, 1908), includes the ruins of an old Spanish mission. Chaco Cañon, New Mexico, (20,629 acres, March 11, 1907), includes the largest prehistoric ruin discovered in the Southwest. Gran Quivira, New Mexico (160 acres, Nov. 1, 1909), includes one of the earliest mission ruins and some pueblo ruins. Navaho, Arizona (360 acres, March 14, 1912), includes a number of ruins of the cliff dwellers. Pinnacles, California (2080 acres, Jan. 16, 1908), includes a number of steep rock formations, under which are caves. Mukuntuweap, Utah (15,840 acres, July 31, 1909), includes a remarkable cañon from 800 to 2000 feet deep. Shoshone Cavern, Wyoming (210 acres, Sept. 21, 1909), includes a limestone cave which has been explored in part only. Sitka, Alaska (57 acres, March 23, 1910), includes the site of an old Indian village where the Indians defeated the Russians in 1804. Lewis and Clark Cavern, Montana (160 acres, May 16, 1911), includes a limestone cavern of great beauty. Colorado, Colorado (13,883 acres, May 24, 1911), includes many impressive and colored rocks similar to those in the Garden of the Gods. Papago Saguaro, Arizona (2050 acres, Jan. 31, 1914), includes a collection of characteristic desert flora as well as prehistoric pictographs.

The following monuments, most of which are in national forests, are under the jurisdiction of the Secretary of Agriculture: Grand Cañon, Arizona (806,400 acres, Jan. 11, 1908), includes the Grand Cañon of the Colorado River. Cinder Cone, California (5120 acres, May 6, 1907), is of scientific value in the study of volcanic activity. Lassen Peak, California (1280 acres, May 6, 1907), includes the volcanic cone of Lassen Peak, which was supposed to be extinct, but which was in eruption in 1914. Gila Cliff Dwellings, New Mexico (160 acres, Nov. 16, 1907), includes some cliff dwellings in a region where few are found. Tonto, Arizona (640 acres, Dec. 19, 1907), includes two ruins of prehistoric cliff dwellings. Jewel Cave, South Dakota (1280 acres, Feb. 7, 1908), comprises a limestone cavern of considerable interest. Wheeler, Colorado (300 acres, Dec. 7, 1908), includes a number of fantastic pinnacles that are the result of erosion. Oregon Caves, Oregon (480 acres, July 12, 1909), includes a limestone cave that has been only partly explored. Devil Postpile, California (800 acres, July 6, 1911), includes an area of basaltic rock in the form of immense columns. Mount Olympus, Washington (608,480 acres, April 17, 1912), includes a mountain area comprising a number of glaciers as well as the breeding ground and summer range of the Olympic elk.

The following national monuments are under the jurisdiction of the Secretary of War: Big Hole Battlefield, Montana (5 acres, June 23, 1910), embraces a tract on which a battle was fought with the Nez Percé Indians in 1877. Cabrillo, California (21,910 square feet, Oct. 14, 1913), includes Point Loma on San Diego

Bay, where Cabrillo discovered California in 1542.

An annual report on the national monuments is issued by the Department of the Interior.

NATIONAL MUSEUM. See UNITED STATES NATIONAL MUSEUM.

NATIONAL NICKNAMES (ME. *nekename, ekename*, by faulty liaison for *an ekename*, additional name, from *eke* + *name*). National nicknames are as a rule first employed by the people themselves. By the familiar JOHN BULL is meant the English nation. The name was first used in the satire of Dr. John Arbuthnot, *Law is a Bottomless Pit*. The sobriquet of JONATHAN or BROTHER JONATHAN has gone through three distinct phases. First, between 1776 and 1783 it was employed, as a mildly derisive term, by the Loyalists, and applied by them to the Patriots; secondly, between 1783 and 1812 it was adopted by the Americans themselves, who used it to designate a country bumpkin; and thirdly, during the war with England in 1812–15 it came into universal vogue as a national sobriquet. The accepted story attributing the origin of the term to a remark made by Washington in allusion to Governor Jonathan Trumbull of Connecticut originated in 1846, and has recently been shown to be without foundation. UNCLE SAM, the familiar sobriquet of the United States government or people, is commonly stated to have originated at the outbreak of the war with England in 1812, when some one, asking what the letters U. S. marked on casks and barrels meant, was facetiously told that they referred to "Uncle Sam" or Samuel Wilson, an obscure citizen of Troy, N. Y., said to have been an inspector or a contractor. This story has not been found earlier than 1842, when it was given in J. Frost's *Book of the Navy*, p. 297. No doubt Frost copied it from some newspaper, but the story lacks proof. The term Uncle Sam has yet to be traced earlier than the fall of 1813, when we read of "Uncle Sam's men," meaning United States customhouse officers, and are told that "*Uncle Sam*, the now popular explication of the U. S., does not pay well." The term appears to have arisen somewhere in the North, perhaps in New York or Vermont; and its origin was presumably merely a jocular extension of the abbreviation U. S., then very common. For three years it ran a career in the newspapers, in 1816 it appeared in a book, and by 1817 its popularity was well established. The American dubs the Mexican GREASER, thereby aspersing the tidiness of the latter's appearance; while the Mexican or Spanish-American returns the compliment with the term GRINGO (the Spanish word for gibberish), which serves to distinguish an American, or, as in South America especially, an Englishman. NICHOLAS FROG, the typical Dutchman, was first used by Arbuthnot in his *Law is a Bottomless Pit*. JEAN CRAPAUD (toad) is the popular nickname of the French nation, collectively taken, and dates back to the time when the ancient kings of France used for their device in heraldry "three toads, erect, saltant," or in a leaping posture, and Paris was called Lutetia, or Mudland. Its streets were so quaggy that the French court called its inhabitants "frogs." An Australian is said to answer to the name CORNSTALK. For the French Canadian we have JEAN BAPTISTE, JOHNNY, JACK, and CANUCK, this last a word of American Indian origin. JACK CANUCK, the type of the young Canadian pioneer, whether of French or British origin, is represented in some of the Canadian comic papers with his sleeves rolled up and carrying an axe on his shoulder. The French peasant is facetiously called JACQUES BONHOMME. DON stands for a Spaniard, in allusion to the dignity of bearing proper to the type. DEUTSCHER MICHEL, signifying a simple countryman, is the facetious nickname applied to the German people, and intended particularly to satirize the weaknesses and foibles of the national character, especially their proverbial lethargy, heaviness, and credulity. A racial, if not a national, designation for the negro is BLACKAMOOR, while in the United States an "unbleached American" should come if called SAMBO. SAWNEY is the sportive designation sometimes applied by the English to the Scotch, and is probably a corruption of Sandy, the abbreviation of Alexander. It was first given to the Scotch by Coleridge. TAFFY, the Welshman, is a corruption of David, one of the most common of Welsh names. PADDY, from Patrick, refers to the Irish. JOHN CHINAMAN is the popular nickname for the Chinese. The Russian nickname, IVAN IVANOVITCH, denotes the typical muzhik as found all over Russia.

NATIONAL REPUBLICAN PARTY. See WHIG PARTY.

NATIONAL SECURITY LEAGUE. An organization incorporated in 1914 by citizens who were convinced that the United States is not adequately prepared for defense. The league favors an army and navy with citizen reserves which will be sufficient only for adequate protection of the country. It does not believe in a large standing army or in any form of militarism. One of its purposes is to lay before the country the plans of defense which have been studied out by the General Staff of the army and the Naval Board, and which have been approved by the successive administrations of the Army and Navy departments. Its further purpose is to urge citizens to coöperate in insisting that Congress pay heed to these advisers and make necessary provision for the protection of the country. Among the means of bringing about these ends is the appointment of a nonpartisan commission of experts and laymen by Congress to consider the problem of defense and bring its conclusions to the attention of the country. The league has committees on army, navy, militia, extension, membership, and finance. The honorary president at the time of its organization was Hon. Joseph H. Choate. The league is a national body with branches throughout the country.

NATIONAL STANDARDS AND EMBLEMS. See STANDARD; NATIONAL ARMS.

NATIONAL UNION. A fraternal beneficiary secret society formed by prominent members of like fraternities at Mansfield, Ohio, in 1881 and incorporated in that State. It led in adopting assessments, graded according to age. Its government is patterned nominally after that of the United States. It reports 747 senate councils, nearly 62,500 members, and total benefits disbursed, nearly $40,000,000.

NATIONAL UNIVERSITY. The proposal to establish a national university in the United States has been frequently mooted since the idea was put forward by George Washington in his first message to Congress. Washington's purpose was to create a great Federal institution of learning at the national capital to provide opportunities which so many students were

seeking in Europe. The project has had its supporters among several succeeding Presidents and was advocated as recently as February, 1915, by ex-President Taft before the National Education Association meeting at Cincinnati. In the early days of the Republic the constitutionality of the maintenance of such an institution by Congress was questioned. More recently the project has been favorably reported upon by committees of Congress in 1890, 1893, 1894, 1896, and 1902, and numerous bills have been introduced—one as recently as 1914 (Sen. 4881, H. Rep. 11,749)—but never with any success.

In general, it is not now intended to establish a university in the ordinary sense of the term so much as to coördinate the facilities now existing in Washington for graduate study. Since it briefly summarizes the intentions of the supporters of the scheme the chief contents of the bill introduced in 1914 may be quoted. The National University is to be created "for the purpose of promoting the advance of science, pure and applied, and of the liberal and fine arts by original investigation and research and by other suitable means; to provide for the higher instruction and training of men and women for posts of importance in the public service of State and Nation and for the practice of such callings and professions as may require for their worthy pursuit a higher training; and to cooperate with the scientific departments of the Federal government, with the Land Grant Colleges founded in pursuance of the Morrill Acts of 1862 and 1890, with the State universities, and with other institutions of higher learning throughout the country. Persons to be admitted must have B.S. or B.A. degree from an institution of recognized standing, or have pursued an equivalent course." The facilities afforded for research studies in Washington, it may be pointed out, include the Library of Congress, the National Museum, the Smithsonian Institution, the Medical Museum, the Patent Office, the Corcoran Gallery, the National Botanic Gardens, the Geological Survey, the observatories, and the government Bureaus of Standards, Statistics, Plant Industry, Soils, Fisheries, Entomology, and Public Roads, all of which represent an equipment of about $60,000,000, and many of which are already open for purposes of research. See also AMERICAN UNIVERSITY.

NATIONAL UNIVERSITY OF IRELAND. An institution for higher education established by Act of Parliament in 1908. By this Act the existing Royal University of Ireland was dissolved and in its place were established the Belfast University and the National University of Ireland. The latter consists of three constituent colleges—University College, Dublin, Queen's College, Cork, and Queen's College, Galway. The chief purpose sought in this reorganization was to provide an institution that would meet the wishes of the Roman Catholics. While the National University is undenominational and free from tests, religious instruction may be given, but not out of public funds. The university received the sum of $850,000 for buildings and equipment and an annual grant of $320,000. The following faculties are maintained: arts, philosophy and sociology, Celtic studies, law, medicine, science, engineering and architecture, and commerce. The enrollment in 1912–13 was about 1440 in the three constituent bodies (University College, 870; Cork, 429; Galway, about 140).

NATIONAL WORKSHOPS, or ATELIERS NATIONAUX, ȧ'te-lyȧ' nȧ'syō'nō'. A plan of giving public employment attempted in France in 1848. The provisional government organized on the overthrow of Louis Philippe by the February revolution passed a decree (February 25) defended by its Socialist members—Louis Blanc, and a few others—declaring the "right to work" and pledging the government to guarantee employment for idle workmen. A few days later "national workshops" were established. As a matter of fact there were no workshops opened; the work provided was in the open air, and consisted largely in planting trees, digging, and constructing roads—works for which few of the applicants were adapted. Their number, however, increased from day to day and at one time reached 130,000. No work could be found for many of the applicants; these received 30 cents a day, while those actually employed were paid 40 cents, although the work they performed was scarcely worth the additional 10 cents. Under these circumstances many workers who were in private employ demanded higher wages or were content to give up their places and remain idle so long as they might receive 30 cents per day for doing nothing. Several attempts were made to bring the scheme within the range of practical feasibility; but political disturbances and personal jealousies made it impossible to carry them out. After four months' trial and a total expenditure of 14,000,000 francs, the system was abandoned when General Cavaignac became Chief of the Executive.

The national workshops are sometimes erroneously confounded with the *ateliers sociaux* in Louis Blanc's plan of labor organization.

NATIVE (from Lat. *nativus*, natal, inborn, from *nasci*, to be born; connected with Gk. *γίγνεσθαι, gignesthai*, Skt. *jan*, AS. *cennan*, archaic Eng. *ken*, to beget). A term applied in chemistry and mineralogy to elements, especially the metals, when found in nature in a chemically free state.

NATIVE BEAR. The Australian koala (q.v.).

NATIVE COMPANION. The Australian Balearic crane (q.v.).

NATIVE PARAFFIN. See OZOCERITE.

NATIV'ITY (Lat. *nativitas*, birth, from *nativus, natal*, inborn), THE. The birth of Christ, a favorite subject in most periods of Christian art. The Virgin is usually represented as the joyous mother in the act of adoration, Joseph as grave and silent; the ox and the ass, which according to traditions witnessed the birth and adored the Christ child, as well as ministering and singing angels, are usually present. In painting the contemporaneous adoration of the shepherds is often added to the scene. The subject occurs occasionally in early Christian sarcophagi, more frequently in ancient and mediæval ivories, and often in illuminated manuscripts. In the revival of sculpture and painting during the thirteenth and fourteenth centuries it is one of the most popular subjects, and is always depicted in the cycle of the life of Christ—by the Pisani in their pulpit reliefs at Pisa, Siena, Pistoia, etc.; by Giotto at Assisi, the Arena Chapel, Padua, and Santa Croce, Florence; by Duccio in his "Majestas," Siena Cathedral; and by many others. In the fifteenth century it was painted with great sweetness by Fra Angelico at San Marco and elsewhere; by Filippo Lippi (Florence Acad-

emy); by Ghirlandaio (Dresden Gallery); by Piero della Francesca and Botticelli (National Gallery, London); by Tintoretto in San Rocco; and, most celebrated of all, by Correggio in his "Holy Night" (Dresden Gallery). (See Plate of Correggio.) The sculptors of the fifteenth century represented the subject in the group called "Presepio," of which there is a good example by Antonio Rossellino in the Metropolitan Museum, New York, and in reliefs. The most celebrated paintings on the subject by Germanic painters are by Hugo van der Goes (Uffizi, Florence), by Albrecht Dürer, especially in his great series of engravings, and by Rembrandt (Pinakothek, Munich). Consult the bibliography of Jesus Christ in Art.

NATOMA, nȧ-tō'mȧ. An opera by Victor Herbert (q.v.), first produced at Philadelphia, Feb. 25, 1911.

NATORP, nä'tôrp, Paul Gerhard (1854–). A German philosopher of the Neo-Kantian type. He was born at Düsseldorf, studied in Berlin, Bonn, and Strassburg, and in 1885 became professor extraordinary and in 1893 professor at Marburg. His works include: *Descartes's Erkenntnisstheorie* (1882); an edition of Democritus' *Ethics* (1893); *Religion innerhalb der Grenzen der Humanität* (1894; 2d ed., 1908); *Platos Staat* (1895); *Socialpädogogik* (1898; 3d ed., 1909); *Platos Ideenlehre* (1903); *Allgemeine Psychologie in Leitsätzen zu akademischen Vorlesungen* (1904; 2d ed., 1910); *Allgemeine Pädagogik in Leitsätzen zu akademischen Vorlesungen* (1905; 2d ed., 1913); *J. H. Pestalozzi* (1906; 2d ed., 1910); *Gesammelte Abhandlungen zur Sozialpädagogik* (1907); *Volk und Schule Preussens vor hundert Jahren und heute* (1908); *Pestalozzi, sein Leben und seine Ideen* (1909; 2d ed., 1912); *Die logischen Grundlagen der exakten Wissenschaften* (1910); *Philosophie: ihr Problem und ihre Probleme* (1911); *Allgemeine Psychologie nach kritischer Methode* (1912); *Hoffnungen und Gefahren unserer Jugendbewegung* (1914).

NA'TROLITE (from Eng. *natron*, from Ar. *natrūn, nitrūn*, native carbonate of sodā, from Gk. *νίτρον, nitron, λίτρον, litron*, natron, of Semitic origin (cf. Heb. *neter*, from *nātar*, to loose) + Gk. *λίθος, lithos*, stone). A mineral sodium-aluminium silicate of the zeolite group. It crystallizes in the orthorhombic system, has a vitreous, sometimes pearly, lustre, is transparent or translucent, and ranges in color from white or colorless to gray, yellow, and red. Natrolite is found in cavities in basalt and other igneous rocks, at various localities in Bohemia, the Tirol, Ireland and Scotland, in Nova Scotia, in the Lake Superior region, and at Bergen Hill, N. J. It is capable of receiving a high polish, and has been used as a gem for rings and other ornaments, especially in the form of the letter N in initial jewelry.

NA'TRON. A hydrous sodium carbonate that crystallizes in the monoclinic system and is found in nature only in solution, as in the Soda Lakes of Egypt. Of similar character is the *trona*, an impure hydrogen sodium carbonate, which occurs as thin crusts along the margin of lakes in Egypt, Siberia, Tibet, and on the borders of the Black and Caspian seas. These minerals form the source of the soda salts of the ancient Egyptians, and were used by them in their arts, especially in embalming (q.v.). Of like character is the carbonate of soda found at the bottom of the lake at Lagunillas near Mérida, Venezuela, which is called by the Indians *urao*. Similar efflorescences are found in San Bernardino and Inyo counties, California, where they are formed by the spontaneous evaporation of saline waters. See Mummy.

NATTER, nät'tẽr, Heinrich (1846–92). An Austrian sculptor, born at Graun, Tirol. He studied at the Polytechnicum in Augsburg under Guyer and at the Academy in Munich. He lived in Munich and afterward in Vienna. Besides many portrait busts of celebrities he produced a number of memorial statues and groups, notably the Zwingli Monument (1885) at Zurich, the Haydn Monument (1887) in Vienna, "Walther von der Vogelweide" (1889) at Bozen, and the heroic statue of Andreas Hofer (1892) on Mount Isel, near Innsbruck, his principal work, though less individual in characterization than his other historical statues.

NATTERJACK, nät'ẽr-jăk (from AS. *nædre*, Goth. *nadrō*, Ger. *Natter*, adder + *jack*). A common, light-colored, rather smooth toad (*Bufo calamita*) of western Europe, found in sandy districts. Its very active habits have given it the name "running toad" in some localities in England.

NATTIER, nȧ'tyȧ', Jean Marc (1685–1766). A French portrait painter, born in Paris. He was the son and pupil of the painter J. B. Nattier, and also studied under Jean Jouvenet and at the Academy. As a youth he was commissioned by the King to make drawings of the Rubens series, then in the Luxembourg; and in 1715 he went to Amsterdam to paint portraits of Peter the Great, of his wife, Catharine I, and of members of their suite. On his return he was received into the Academy (1718), as an historical painter, but after sustaining financial losses confined himself to portraiture. In this field he soon attained great popularity. If Rigaud is the painter par excellence of the men of his time, Nattier has done as much for the women. He painted repeatedly every member of the royal family, and most of the notabilities of the court. Though not exempt from mannerisms, and flattered rather than individualized, his portraits possess abundant charm, great purity of line, and harmonious refinement. His sitters are usually treated as mythological or historical characters. There are many portraits by him at Versailles, such as those of Maria Leszczynska, Madame Henriette de France, Madame Adelaide, Louise Henriette de Bourbon, and a family portrait of himself with his wife and children. The Wallace collection, London, and the Musée Condé, Chantilly, are rich in fine examples of his work, notably the portraits of Mademoiselle de Clermont; the Louvre possesses five Nattiers, including the celebrated Mademoiselle de Lambesc as "Minerva," and the Metropolitan Museum, New York, contains the Princess de Condé as "Diana." Other well-known works are Madame de Châteauroux as "Dawn" and Madame de Flavacourt as "Silence," Maurice de Saxe, Dresden Gallery, and the Duchesse de Chartres as "Hebe" (1744), Stockholm Gallery. Consult: *Masters in Art*, vol. iii (Boston, 1902), containing an exhaustive bibliography, and Pierre de Nolhac, *Nattier, peintre de la cour de Louis XV* (Paris, 1910).

NAT TURNER'S INSURRECTION. See Turner, Nat.

NATUNA (nȧ-tōō'nȧ) **ISLANDS.** A group of islands in the South China Sea, northwest of

Borneo, belonging to Holland (Map: Australasia, C 2). They are for the most part densely wooded and mountainous, but have some cultivated tracts which produce maize, rice, sago, and coconuts. The area is estimated at 803 square miles, and the inhabitants, who are chiefly Malay fishermen, number about 8000.

NAT'URAL (from Lat. *naturalis*, according to nature, from *natura*, nature, from *nasci*, to be born; connected with Gk. *γίγνεσθαι, gignesthai*, to become, Skt. *jan*, to beget, AS. *cennan*, archaic Eng. *ken*, to beget). In music, the sign ♮, which, placed before a note, counteracts the effect of a previous ♯ or ♭ and restores the note to its normal or natural place. To counteract a double sharp or a double flat (𝄪, 𝄫) a single natural is used, although it was formerly customary to write a double natural (♮♮). This form is superfluous and incorrect. In a key with many sharps or flats a doubly raised or lowered interval is generally restored to the chromatically altered tone required by the key signature. Thus, in G flat a 𝄫 would be restored, not to b, but to ♭, which is indicated by ♮♭. Likewise in a signature with sharps the *natural* sign appears as ♮ ♯.

NATURAL BRIDGE. Any natural structure of rock or earth which spans a depression. Natural bridges may be formed by various kinds of stream erosion, by wave action, by solution, and in a few other ways. There are more than 50 natural bridges of considerable size in the United States. Of these the best known is the celebrated Natural Bridge, in Rockbridge Co., Va., about 16 miles southeast of Lexington (Map: Virginia, E 4). The present structure was left by the collapse of the remainder of the roof of a tunnel formed, according to Cleland, "by water percolating through a joint or fissure athwart the stream, thence along a bedding plane and emptying under a fall or rapid of the stream. The channel thus formed was gradually enlarged until all the water of the stream was diverted from the stream bed below the point of ingress, leaving a bridge." The bridge thus formed has a span of 90 feet, and is from 50 to 100 feet wide. The thickness of its crown is about 40 feet and its arch is 215 feet above the stream. A public road passes over it.

Other remarkable natural bridges, caused by stream erosion, are the Edwin Natural Bridge, in San Juan Co., Utah, height 111 feet, span 205 feet, width 30 feet, thickness of arch 10 feet; the Augusta Sandstone Natural Bridge, near by in the same county, height 265 feet, span 320 feet, thickness 83 feet, width 35 feet; the Nonnezoshi Bridge, about 50 miles to the southwest (discovered in 1909), length 273 feet, height 308 feet; and the Natural Bridge near the railroad station of the same name in Powell Co., Ky., height 32 feet, span 20 feet, thickness about 12 feet. The bridge near Natural Bridge station in Winston Co., Ala., is a remarkably flat and thin arch of sandstone with a span of about 75 feet, of such symmetrical proportions that one could almost believe it to be the work of man. The Massachusetts Natural Bridge, near North Adams, is of the same class as the Virginia example. It is of white marble, spans Hudson Brook, is 44 feet high, about 25 feet wide, and spans about 10 feet. There is a very symmetrical bridge in Santa Cruz Co., Cal., which was formed by wave erosion. In Florida there are several natural bridges formed by solution but differing from the ordinary conception in that they are not elevated above the stream, and the points where the stream disappears and reappears are often so far apart that one cannot be seen from the other. For detailed description of the principal American bridges (with illustrations), consult the interesting article above quoted from, by Professor Cleland, entitled "North American Natural Bridges, with a Discussion of their Origin," in the *Bulletin of the Geological Society of America*, vol. xxi (New York, 1910), and another article by the same author, "The Formation of North American Natural Bridges," in the *Popular Science Monthly* (New York, May, 1911). See NATIONAL MONUMENTS.

NATURAL GAS. See GAS, NATURAL; GAS, ILLUMINATING AND FUEL.

NATURAL HARMONICS. See HARMONICS.

NATURAL HISTORY. A term used at different times and by different authors in a variety of senses. It was applied at first to the study of all natural objects, including minerals, rocks, and all living beings. The study of external nature and of the phenomena or laws governing the movements of natural bodies was formerly opposed to metaphysics, history, literature, etc. After a while astronomy and chemistry were eliminated from natural history; then natural philosophy, or what is now called physics, was separated from chemistry. But natural science, as distinguished from physical science, has made such progress that we must now know whether our naturalist is a mineralogist, a geologist, a paleontologist, a botanist, a zoölogist, or a specialist in some narrower department of biological study. At present natural history is confined to the study of organic nature, or biology, and students of general physiology and morphology are called biologists. See BIOLOGY; BIONOMICS.

NATURAL HISTORY OF SELBORNE. A work by Rev. Gilbert White (1789). It was produced from letters written by the author to Thomas Pennant and to Daines Barrington on outdoor life in a Hampshire village. Written in a style simple and entirely free from self-consciousness, it shows wonderful observation of nature, with a charm that made it an English classic.

NAT'URALISM. In philosophy, a term used to designate various theories of the universe differing widely among themselves in detail and agreeing only in the claim that nature furnishes an adequate explanation of all that is. But it is obvious that with different conceptions of nature naturalism will take very different forms. The important thing in determining what any naturalism maintains is the ascertainment of what such a naturalism considers as nonnatural. Thus, when the prevailing type of philosophy is theistic (see THEISM), naturalism, as opposed to nonnaturalism in the form of supernaturalism, maintains that the universe must be explained by immanent principles and not by reference to anything that transcends the universe as God in theism is conceived as transcending it. Spinoza (q.v.) with his single substance possessed of an infinity of attributes, two of which are mind and matter, and with this substance as his God, is nontheistic and therefore a naturalist. So similarly Hobbes (q.v.) with his predominant materialism, regarding the motion of matter as the universal cause, is likewise a naturalist. So again when the Kantian philosophy (see KANT) discriminates

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THE NATURAL BRIDGE

between the realm of nature as including all actual and possible experience, on the one hand, and inexperienceable things in themselves on the other hand, these things in themselves are a nonnatural element in the system; and with this feature of Kantianism in mind any development of the Kantian philosophy that eliminates the things in themselves and leaves only the world of experience is a form of naturalism. Thus, though Hegel (q.v.) opposed naturalism in the shape of materialism, he has been called a naturalist as denying reality transcendent of experience. But many Neo-Hegelians and Neo-Kantians maintain that the world of nature is organized by a spiritual principle that transcends time, by a timeless consciousness. The objects of this consciousness are in time, but the consciousness itself is not in time; it is eternal. According to this view the realm of objects is the realm of nature; spirit is a higher principle than nature. As opposed to this recent type of idealism we have several forms of naturalism, allied in denying that nature is a realm of objects existing alone for an untimed consciousness. Thus, materialistic mechanism (q.v.) is naturalistic, maintaining that the laws of matter account for all events, and that mind is merely an inefficient futile accompaniment of certain physical processes. So radical empiricism, instrumentalism, and neo-realism (qq.v.) are naturalistic, maintaining, each in its own way, that spirit is not presupposed in all nature but is itself a part of nature. Of all these types of naturalism the one that plays the largest part in recent literature as naturalism is perhaps materialistic mechanism.

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NATURALISM, IN LITERATURE. See REALISM AND NATURALISM.

NATURALISTS, AMERICAN SOCIETY OF. An association organized in 1883 to exchange ideas relating to the problems of natural history. The society now has an active membership of 350. The meetings of the society are held annually.

NAT'URALIZA'TION. The act or process by which in any country an alien acquires citizenship. The process consists of two parts, viz., the formal renunciation of the old allegiance and the assumption of a new allegiance. The rights and privileges of naturalized citizens are enumerated and defined by the municipal law of every state. In few or no cases are they the same as those of native-born citizens. In the United States they enjoy the same civil rights as natural-born citizens, and all of the political rights except eligibility to the offices of President and Vice President. The right of a subject or citizen to renounce his allegiance with a view to acquiring citizenship in another state is now generally recognized. (See EXPATRIATION.) In order to prevent possible conflicts of jurisdiction growing out of the practice of naturalization and the return of naturalized citizens to their native country, it is customary for states to enter into treaties for the regulation of matters relating thereto. Thus, the United States has entered into 11 treaties with foreign powers, in all of which, except that with Great Britain, it is provided that five years of uninterrupted residence with formal naturalization constitutes citizenship on both sides. A majority of these treaties contain the provision that a naturalized citizen returning to his native state shall, after an uninterrupted residence there of two years, be presumed to have renounced his acquired citizenship. It is also a general principle that naturalization does not release an individual from any obligations to his native state which he may have incurred before emigration, as, e.g., military service; and if he returns to such state he may be held to the fulfillment of his obligations without being able to invoke the protection of the United States, unless treaty stipulations provide otherwise.

In the United States the whole matter of naturalization is subject to the regulation of Congress. By the Law of March 4, 1913, the administration of the naturalization laws was placed under the charge of the Bureau of Naturalization, one of the bureaus of the Department of Labor. Books of record are provided by the bureau for each immigration station, and each alien arriving is registered. A certificate of registration is given to such alien, for use in case he desires to apply for naturalization. Exclusive jurisdiction over the naturalization of aliens is given to the United States district courts, United States district courts for the Territories of Hawaii and Alaska, the Supreme Court of the District of Columbia, and to State and Territorial courts of record having jurisdiction in suits in law or equity where the amount in controversy is not limited.

Two years prior to admission to citizenship the applicant must declare before clerk of such court his bona fide intention of becoming a citizen of the United States. Such declaration must state the age, occupation, place of birth, date of arrival in the country, and other particulars that may serve for purposes of identification. Not less than two years, and not more than seven years, after this declaration has been filed, the applicant must file with one of the courts having jurisdiction in the matter a petition signed in his own handwriting, with full name, place of residence, occupation, date and place of birth, etc. The petition must further set forth that he is not a disbeliever in organized government, and that he renounces allegiance to any foreign government, and intends to become a citizen of the United States. The petition must be verified by two credible witnesses, citizens of the United States, who must state that they have known him to be a resident of the United States for at least five years continuously, and of the State or Territory in which the petition is filed for at least one year preceding the application, and that he is of good moral character. Final action on the petition may not be taken within 90 days after it has been filed, and no certificate of naturalization may be granted within 30 days preceding a general election.

No alien may be naturalized who cannot speak the English language. This provision is not applicable to those who are physically unable to

speak, nor to those who shall make homestead entries on the public lands.

Aliens who owe allegiance to the United States (i.e., inhabitants of the dependencies) may file their declaration of intention to become citizens immediately on entering upon residence in the United States, and may after the lapse of not less than two years receive certificates of naturalization. Since 1802 the term of residence has remained at five years. A minor alien who has resided in the United States for three years next preceding his arrival at the age of 21, and who has continued to reside there up to the time of his application, may be admitted to citizenship without the previous declaration, provided he has resided in the United States for a period of five years. Aliens of 21 years and upward who have been honorably discharged from service in the United States army are not required to make the declaration of intention. Similarly aliens who have served five consecutive years in the United States navy, or one enlistment in the marine corps, may be admitted to citizenship without previous declaration of intention. The widow and children of an alien who has declared his intention of becoming a citizen, but dies before completing the steps, have not, since 1906, been regarded as citizens upon taking the oath prescribed by law. An alien woman who marries a citizen of the United States, and who herself might be lawfully naturalized, is considered a citizen. Children born outside of the limits of the United States, but of parents who are citizens, are considered as citizens; but the rights of citizenship in such cases do not descend to children whose parents never resided in the United States. Since 1870 the privilege of naturalization has been extended to aliens of African nativity and of African descent. Chinese aliens are excluded by statute of Congress from the privilege of naturalization.

Consult F. J. Franklin, *Legislative History of Naturalization in the United States* (Chicago, 1906), and G. B. Davis, *Elements of International Law* (3d ed., New York, 1908). See ALIEN; ALLEGIANCE; CITIZEN.

NATURALIZATION. In biology, the establishment of plants and animals in a new region, especially through the agency of man. Primarily, exotic species soon become feral and compete with indigenous species. They frequently never gain a foothold, but if they do they usually spread at first with extraordinary vigor, owing to the absence of their natural enemies. But later an adjustment with the other species in the country occurs, and after that the disproportionate numbers of the introduced form disappear, i.e., the new species become adjusted or naturalized. Compare ACCLIMATIZATION.

NATURAL LAW. Greek Philosophy. Some of the Greek Sophists, and later the Epicureans, held that law and justice were arbitrary conventions established by the weak for self-defense against the natural right of the strong. Socrates, in this as in other matters, antagonized the theories of the Sophists; but it was Aristotle who formulated the conception of natural justice which has remained dominant to the present day. In his view justice is in part legal, in part natural. Legal justice deals with matters which must be regulated, but which may be variously regulated. Natural justice, on the other hand, is not arbitrary; its rules are everywhere similar. The Stoics went further: they asserted that the rules of natural justice were founded on reason and were therefore discernible by reason; and the later Stoics termed this rational order *natural law*.

Roman Jurisprudence. The Roman lawyers noted the fact that many substantially identical rules were observed by all the Mediterranean nations and to this common law they gave the name "law of nations" (*jus gentium*). In the first century before Christ they began to speak of "natural law." In the Roman juristic literature the term is used in four different senses: 1. Natural law is identified with universal law (*jus gentium*). This is practically the Aristotelian sense. 2. Natural law is contrasted with the law observed by all nations; e.g., it is said that by nature all men are free, and that slavery has been introduced by the law of nations. This is the Stoic conception of natural law. 3. Sporadically the Epicurean idea appears, as when it is said that buyers and sellers have a natural right to overreach one another as regards price. 4. Ulpian has a theory which seems to have been peculiarly his own, but to which Justinian gave a factitious importance by including in his *Institutes* Ulpian's definition: "Natural law is that which nature has taught all living things." The illustrations, which refer to rudimentary family life, are rather biological than legal. Although the Roman jurists referred to the law of nature for the interpretation of their own law, and even drew from it supplementary rules where their own law was silent, they referred far more frequently, and for the same purposes, to "natural reason" and to "equity"; and they never ascribed to the law of nature such authority as to question the validity of a Roman rule because it was not in accordance with natural law. See CIVIL LAW; JUS GENTIUM; JUS NATURÆ.

Mediæval Theories. The doctrines of Aristotle and of the Roman jurisprudence were generally accepted in the Middle Ages as authoritative, and many attempts were made to reconcile them. There was a marked tendency to identify natural law with the law of God: in the *Decretum* of Gratian it is declared that natural law is identical with the Golden Rule. Thomas Aquinas divided all law into four classes—eternal, divine, natural, and human. The eternal law is the controlling plan of the universe, existing in the mind of God. A part of this eternal law has been directly revealed to men; this is the divine law. Another part is discerned by human reason; this is natural law. Except in its fundamental principles, natural law is not immutable, for "it seems to be natural to the human reason that it comes gradually from the imperfect to the perfect." Human law is the application of natural law to particular conditions. The practical influence of these theories upon the development of European law during the Middle Ages was slight. In the development of the English common law, as in the development of the Roman Imperial law, appeals to natural reason were far more frequent than appeals to natural law. In England, however, as well as on the Continent, the general law merchant, which was *jus gentium* in the Roman sense, was recognized as natural law.

Modern Theories. *Natural Law as a Factor in Legal Reforms.*—The general effect of the Protestant Reformation was to free the conception of natural law from ecclesiastical associations and limitations and to reëmphasize its rational character. Natural-law theories became

effective factors in the reform of the law. In the seventeenth century natural law was treated as a source of international law, and many rules which had not yet become rules of international custom attained this position through the writings of Grotius, Pufendorf, and others on "the law of nature and of nations." Later during the eighteenth century and the earlier years of the nineteenth, when the great national codes of civil and criminal law were drawn up in Prussia, Austria, France, and other countries, natural-law theories helped to give the legislators a more independent attitude towards established law and custom. In England utilitarianism played a similar part in facilitating law reform.

Natural Rights as the Basis of Political Revolution.—The theory of Cicero and of Thomas Aquinas, that laws in conflict with natural law are not truly laws, developed its revolutionary (not to say anarchistic) possibilities when the interpretation of natural law passed from secular and ecclesiastical authorities to the people at large. The theory that the popular consciousness is the true interpreter of that natural law by which all rulers are bound, found frequent expression before the close of the Middle Ages—e.g., in the writings of Marsiglio of Padua. With the Protestant Reformation these theories became practical forces in matters religious and political, and the tendencies which they represented first obtained a temporary triumph in England under the Commonwealth. Those legal rights which Englishmen had succeeded, through centuries of conflict, in asserting against the crown were brought by the Levelers into connection with the natural-law theories of the Continent, and thenceforth the rights of the individual to life, liberty, and property were "natural" rights. To these were soon added the right to participate in the constitution of government. As formulated by Locke and reformulated by Rousseau, these natural-right theories legitimized the revolutions which established the modern constitutional state.

Reaction against Natural-Law Theories.—The first noteworthy philosophical reaction against the revolutionary natural-law theories was that of Hobbes (q.v.). Equally hostile to natural-law theories was, especially at the outset, the historical school of jurisprudence. The conception of law as a product of historical evolution in each nation led to the assertion that there could be no such thing as eternal or universal law. With the development of comparative study, however, it is again perceived that beneath all the diversity of national laws there is a substantially uniform element which may be called human or universal or natural. This natural law, however, is substantially the *jus gentium* of the Romans or the "natural justice" of Aristotle, and not the natural law of the Stoics or of the Middle Ages; for it is not discerned by reason, it is rather revealed by the conduct of the human race.

The doctrine of a natural law, or law of nature, underlying all positive law and resting upon fundamental human morality, has played an important part in the development of actual legal institutions. Though seldom referred to under that name in English and American legal decisions, it has, under the name of the law of reason or common sense, profoundly influenced the course of our legal development. See JURISPRUDENCE; JUSTICE; LAW.

Bibliography. The following are some of the more recent works; in them will be found ample references to the older literature. Gierke, *Johannes Althusius und die Entwickelung der naturrechtlichen Staatstheorien* (Leipzig, 1880); Lorimer, *Institutes of Law: A Treatise of the Principles of Jurisprudence as Determined by Nature* (2d ed., Edinburgh, 1880); Rothe, *Traité de droit naturel* (Paris, 1884–95); Ahrens, *Cours de droit naturel* (8th ed., Leipzig, 1892); Anzilotti, *La scuola del diritto naturale* (Florence, 1892); Bergbohm, *Das Naturrecht der Gegenwart* (Leipzig, 1892); Bryce, "The Law of Nature," in *Studies in History and Jurisprudence* (New York, 1901); E. V. Abbot, *Justice and the Modern Law* (ib., 1913).

NATURAL RIGHTS. See NATURAL LAW.

NATURAL SELECTION. The evolution idea is as old as the time of the Greek philosophers, but that form of it called natural selection, or Darwinism, dates from 1858, when the theory was stated by Darwin (q.v.) and also by Wallace (q.v.), each independently of the other. Nearly a century earlier Buffon, and afterward Erasmus Darwin, had suggested that species were mutable, and that all living beings had descended from some primitive type or germ, the transformation having been effected by changes of climate, food, exercise, and so on. But the real founder of the modern theory of organic evolution was Lamarck (q.v.; see also LAMARCKISM). The chief agents or factors of organic evolution which he proposed were changes of environment, of climate, soil, food, temperature, use, and disuse, while he briefly mentions the agency of competition, the results of geographical isolation, and the swamping effects of crossing, besides use inheritance. Although supported by a few though well-selected facts, Lamarck's views were, owing to the influence of Cuvier and the deep-seated prejudice of the times, ignored and well-nigh forgotten, except to be called up and ridiculed. Yet between the date of Lamarck's death in 1829 and shortly before 1858 nearly 30 naturalists, most of them of eminence, had publicly enunciated in a tentative way evolutional views —among them Grant, Wells, Naudin, D'Halloy, Schaaffhausen, Wallace in 1855, and others. Meanwhile Hutton and Lyell had advanced uniformitarian views in geology. Progress in the knowledge of the flora and fauna of the earth had greatly increased. The cell doctrine had been advanced; the sciences of paleontology, embryology, and morphology had been founded and were rapidly gaining ground.

As early as March, 1852, Herbert Spencer, in an essay published in the *Leader*, advocated the theory of the modification of species by changes of environment, and a few years later adopted the word "evolution," applying it to psychology and later to sociology and comparative religion.

History of the Rise of the Selection Theory. Such was the state of certain isolated scientific and philosophic minds, though the rank and file of naturalists were either indifferent or opposed to the theory of descent, when in 1858 the preliminary essays of Darwin and of Wallace were given to the public. Their views, which were destined to give such a decided impulse to biological inquiry, were independently confirmed by several biological experts after years of experience and research in all parts of

the globe. The botanist Sir Joseph D. Hooker, when surgeon and naturalist of the *Erebus* in the Antarctic expedition under Sir John Ross, published a flora of New Zealand, a *Flora Antarctica*, and in 1859 published his *Introduction to the Flora of Australia*, in which he advocated the selection theory. Before this (1858) Wallace had spent four years on the Amazon, and afterward eight years in the East Indian Archipelago, making large collections and careful observations. Meanwhile Charles Darwin, as the naturalist of the *Beagle* for nearly five years (1831–36) during her voyage around the world, was constantly exercising his marvelous powers as an observer. What chiefly led him, as early as 1839, to begin to favor the theory of descent, were his observations on the fossil mammals, the colossal armadillos and sloths, and the like, of South America, which appeared to be the ancestors of the degenerate forms now living; also the occurrence of local species on each of the Galapagos Islands, which he found to be very similar to those of the South American coast and yet slightly different. The result was that after 20 years of observations, experiments in his garden, and reflection, he elaborated the theory of natural selection.

On the first of July, 1837, he opened his first notebook to record any facts bearing on the origin of species, but "did not become convinced that species were mutable until two or three years had elapsed." More than a year after (October, 1838) he says: "I happened to read for amusement Malthus on *Population*, and being well prepared to appreciate the struggle for existence which everywhere goes on from long-continued observations of the habits of animals and plants, it at once struck me that under these circumstances favorable variations would tend to be preserved, and unfavorable ones to be destroyed. *The result of this would be the formation of new species.*" It is worthy of notice that Malthus was the father of natural selection, that the *Essay on Population* was the source of inspiration of both Darwin and Wallace, and that to this fact is apparently due the exact similarity in, or coincidence of, their views. Darwin's preliminary essay, together with that of Wallace, who also had read Malthus's *Essay on Population* containing nearly identical selection views, was published in 1858. In the following year appeared Darwin's epoch-making *Origin of Species*. His theory was at once accepted by Canon Tristram, Lyell, Hooker, Bates, Huxley, and others in Great Britain; in the United States of America by Asa Gray and Jeffries Wyman, and in Germany by Haeckel, while Fritz Müller, working on the same lines in Brazil, fully accepted and extended his views. That the time was ripe for the development and growth of the evolutionary idea was proved by its speedy and general acceptance by nearly all working naturalists and thoughtful minds. Moreover, the selection phase was easy to understand by laymen, and soon the multitude accepted the new views.

The Natural-Selection Theory Explained. The theory of natural selection is based on the facts of variation. As to the causes of variation, Darwin does not say much in the *Origin of Species*. Basing his theory on the fact that variations are constantly and spontaneously arising, he claimed that the favorable variations have succeeded in the struggle for existence, while those unfit or unfavorable have perished.

He also remarked that, as long as the conditions of life remain the same, we have reason to believe that a modification which has already been inherited for many generations may continue to be inherited for an almost infinite number of generations. We are also told that, as each land had undergone great physical changes, we might have expected to find that organic beings have varied under nature in the same way as they have under domestication. "And if there be any variability under Nature, it would be an unaccountable fact if natural selection did not come into play." "If, then," he asks, "animals and plants do vary, let it be ever so little or so slowly, why should we doubt that the variations or individual differences which are in any way beneficial would be preserved and accumulated through natural selection, or the survival of the fittest? If man can by patience select variations useful to him, why, under changing and complex conditions of life, should not variations useful to Nature's living products often arise, and be preserved or selected? What limit can be put to this power, acting during long ages and rigidly scrutinizing the whole constitution, structure, and habits of each creature—favoring the good and rejecting the bad? I can see no limits to this power, in slowly and beautifully adapting each form to the most complex relations of life."

Geometrical Ratio of Increase of Organisms. "A struggle for existence," says Darwin, "inevitably follows from the high rate at which all organic beings tend to increase." There is a vast destruction of seeds, eggs, embryos, and young. Were this not the case the earth would soon become covered with the progeny of a single pair. Linné pointed out that an annual plant producing two seeds only—and there is no plant nearly so unproductive as this—and these each producing two in the following year, and so on, would in 21 years produce over 1,000,000 plants. The elephant is regarded as the slowest breeder of all known animals, yet a single pair would become in the course of about seven and a half centuries, if all lived to the close of the breeding age, the ancestors of nearly 19,000,000 elephants.

The rate of increase of an animal, each pair producing 10 pairs annually, and each animal living 10 years, is shown in the following table, copied from Marshall's Lectures:

YEAR	Pairs produced	Pairs alive at end of year
1.....	10	11
2.....	110	121
3.....	1,210	1,331
4.....	13,310	14,641
5.....	146,410	161,051
10.....	.....	25,937,424,600
20.....	.....	Over 700,000,000,000,000,000,000

Immense numbers of eggs are laid by certain animals, and yet there are probably no more individuals now than centuries ago, the number of individuals remaining as a whole stationary. The queen bee lays during her whole life 1,000,000 eggs, the conger eel is estimated to deposit 15,000,000, the oyster from 500,000 to 16,000,000, and a very large oyster may produce even 60,000,000 eggs. "Supposing," says Marshall,

"we start with one oyster and let it produce 16,000,000 eggs, the average American yield, and let half, or 8,000,000, be females and go on increasing at the same rate; in the second generation we shall have 64 millions of millions of female oysters. In the fifth generation—i.e., the great-great-grandchildren of our first oyster—we should have 33 millions of millions of millions of millions of female oysters. If we add the same number of males we should have in all 66 + 33 naughts. If we estimate these as oyster shells we should have a mass more than eight times the size of the world."

Darwin also claimed that natural selection "acts solely by accumulating slight, successive, favorable variation," and can produce no great or sudden modification. It can act only by short and slow steps, hence "the canon of *Natura non facit saltum*, which every fresh addition to our knowledge tends to make truer, is on this theory intelligible."

Use and Disuse. Darwin in some cases admits the action of use and disuse. In both varieties and species, he says, use and disuse seem to have produced a considerable effect. His examples are blind cave animals, the burrowing South American tuco tuco, which is occasionally blind, and certain moles; also the loggerheaded duck, which has wings incapable of flight, in nearly the same condition as in the domestic duck. Instincts he regards as having been slowly acquired through natural selection. See USE INHERITANCE.

The Geological Record. He then dwells on the geological record, which, although it is very imperfect, nevertheless strongly supports, he claims, the theory of descent with modification. The extinction of species and of whole groups of species almost inevitably follows from the principle of natural selection, for old forms are supplanted by new and improved forms. The fact, he says, that the fossil remains of each formation are in some degree intermediate in character between those in the strata above and below, is simply explained by their intermediate position in the chain of descent. The grand fact that all extinct beings can be classed with all recent beings naturally follows from the living and the extinct being the offspring of common parents. Species have generally diverged in character during their long course of descent and modification, and thus the more ancient types are in some degree intermediate between existing groups. Recent forms are more improved and generally more specialized than the earlier ones. Yet certain forms have retrograded, while others have retained "simple and little-improved structures," being what are called persistent types.

Geographical Distribution. The facts of geographical distribution are also utilized by Darwin, who calls attention to the past migrations of animals from one part of the world to another owing to former climatic and geographical changes. They also explain why on the same continent under the most diverse conditions most of the inhabitants within each great class are plainly related, the reason being that they are the descendants of the same progenitors and early colonists. They explain why oceanic islands are inhabited by only few species, most of these, as those of Madagascar, being peculiar or endemic species. Moreover, the existence of closely allied or representative species in any two areas, as Europe and North America, implies that the same parent forms formerly inhabited both areas. It is also the rule that nearly all the inhabitants of islands have been derived from ancestors which lived on the nearest mainland. Thus, the plants and animals of the Galapagos Archipelago, of Juan Fernandez and the other American islands, are closely related to those of the neighboring American mainland, while those of the Cape Verde Archipelago and other African islands were derived from the opposite African coast.

Facts of Morphology, Embryology, the Doctrine of Homologies. These were also drawn upon by Darwin. He maintained that adaptive characters, though of paramount importance to the beings, are of hardly any importance in classification, while vestigial characters are often of high classificatory value, the most valuable of all often being embryological characters. "The real affinities of all organic beings, in contradistinction to their adaptive resemblances, are due to inheritance or community of descent."

Natural Selection not the Exclusive Means of Modification. It should be observed that Darwin frankly expressed the conviction that natural selection, though the most important, has not been the exclusive means of modification. He allowed that absence of eyes in cave animals is not the result of natural selection, saying: "I attribute their loss wholly to disuse."

The Causes of Variation. In the first edition of his *Variation of Animals and Plants under Domestication* Darwin, after defining the definite action of the environment, added: "A new subvariety would thus be produced without the aid of natural selection," but this passage was omitted from the second edition. Besides the *Origin of Species* Darwin published a number of other works, the most important of which was *The Variation of Animals and Plants under Domestication* (1868). Towards the end of his life he gave more attention to the causes of variation, which at first he said were unknown, and in the work just cited he says: "Changes of any kind in the conditions of life, even extremely slight changes, often suffice to cause variability" (2d ed., ii, p. 258); and again: "Variations of all kinds and degrees are directly or indirectly caused by the conditions of life to which each being, and more especially its ancestors, have been exposed," adding: "To put the case under another point of view, if it were possible to expose all the individuals of a species during many generations to absolutely uniform conditions of life, there would be no variability" (ii, pp. 253, 255–256). He attributes the differences in races of cats living in Paraguay, at Mombasa, East Africa, and in Antigua, "to the direct action of different conditions of life" (i, p. 49); so with the horses of the South American pampas and of Puno. He refers to Dr. J. A. Allen's conclusions relative to the direct action of the climate in producing geographical varieties of birds, and concludes that "these differences must be attributed to the direct action of temperature" (ii, p. 271). So also, accepting the results of Meehan's comparisons on the leaves of 29 kinds of American trees with their nearest European allies, Darwin candidly admits that "such difference cannot have been gained through natural selection, and must be attributed to the long-continued action of a different climate" (ii, p. 271).

The objections to his theory raised by Darwin himself he discusses with his usual candor. Of these the most important is the absence, to use his own words, of the "interminable number of intermediate forms" which must have existed, "linking together all the species in each group by gradations as fine as are our present varieties." He says he can only answer this objection "on the supposition that the geological record is far more imperfect than most geologists believe." The other objection is the existence of two or three castes of worker or sterile ants in the same community.

Status of Darwinism at the Present Day. Such are the views of Darwin, as published in his *Origin of Species*. Although he pushed the special form of evolution to what one would suppose to be its furthest limits, yet as we have seen he somewhat modified his views later in life. The views of probably a large proportion of the moderate Darwinians at the present time have been expressed in a broad and candid way by Romanes, an able and careful commentator and expounder of the doctrine of natural selection. In his *Darwin and after Darwin* (1892), the most clear and readable exposé of the doctrine, the doctrine is thus stated. All plants and animals are perpetually engaged in the struggle for existence. This strife consists in the fact that in every generation of every species a great many more individuals are born than can possibly survive. Now, nature "selects the best individuals out of each generation to live." "And not only so, but, as these favored individuals transmit their favorable qualities to their offspring according to the fixed laws of heredity, it further follows that the individuals composing each successive generation have a general tendency to be better suited to their surroundings than were their forefathers. . . . And this follows not merely because in every generation it is only the 'flower of the flock' that is allowed to breed, but also because, if in any generations some new and beneficial qualities happen to arise as slight variations from the ancestral type, they will (other things permitting) be seized upon by natural selection, and, being transmitted by heredity to subsequent generations, will be added to the previously existing type." At the present day an increasing number of evolutionists do not regard natural selection as an active cause, but rather as the result of the action of a number of other agents, comprising the Lamarckian factors of change of environment, use, disuse, isolation, and so on. Undoubtedly, as the result of competition, animals have been driven to migrate, to adopt new habits, and thus to undergo modification. Many agree with Herbert Spencer as to the inadequacy of natural selection to account for the origination of new forms. From probably one-third to nearly one-half of the species of plants and animals now existing are climatic, local forms, resulting from the direct action of changes in the conditions of life, such as climate, soil, food, and the like. The great number of species of parasitic animals are the result of the young adopting a fixed or a more or less stationary mode of life. Natural selection is inoperative in the case of blind or eyeless cave and deep-sea animals.

Objections to Natural Selection. The objections now being urged to the special doctrine of natural selection are that, (1) to use Herbert Spencer's word, it is "inadequate"; (2) the favorable variation may be destroyed by the swamping effects of crossing; (3) natural selection is not analogous to artificial selection; nature is continually eliminating monstrosities, sports, variations, instead of preserving them; they are constantly being bred out in wild plants and animals, or those living under natural conditions of existence. The otter or ancon sheep, which under the breeder's care and watchfulness became a peculiar variety, when permitted to mingle or cross with normal sheep became extinct. Natural selection accounts for the preservation rather than the origination of new or incipient forms and structures. For the causes of variation, it is maintained, we must look to the action of the primary factors of organic evolution, viz., to the effects of changes in light, temperature, heat, moisture, dryness, altitude, food, and so on.

(4) It is not necessarily the fittest or most useful structures or individuals which survive. Carnivorous animals in seizing or swallowing immense numbers of eggs, embryos, and adult animals do not select this or that individual, but, on the contrary, old and young, the fit and the unfit, weak and strong, are engulfed in the maw of the whale as it swims through a shoal of minute crustacea; or hundreds of small fishes are indiscriminately, without reference to their fitness, swallowed by sharks. So with aphides existing in hundreds of thousands on some tree, the birds, like old Time of the New England Primer, indiscriminately pick off "all, both great and small." This matter of the survival of the fittest and the extinction of the unfit has perhaps been somewhat exaggerated, although it is granted that competition acts unceasingly in the biological environment.

(5) Darwinians acknowledge, as does Wallace in his *Darwinism*, that no one ever saw a species originated by natural selection; Weismann has frankly affirmed that "it is really very difficult to imagine this process of natural selection in its details; and to this day it is impossible to demonstrate it in any one point." (*Contemporary Review*, 1893, p. 322.) Yet a number of temperature species, races, or breeds have been experimentally produced by changes of temperature. The cases of seasonal dimorphism existing in nature have been exactly paralleled by variations in moths and butterflies subjected in the pupa state to cold or to extreme heat; and dry-season and wet-season as well as summer and winter forms have been produced artificially, besides other variations supposed to be extinct phylogenetic species.

(6) The view peculiar to Darwinism is that some individual variation was nursed and preserved, while all the others less favorable died. Some naturalists claim that the better-founded view is that of Lamarck, that the changes of environment simultaneously affected great numbers of individuals in a given region, which became modified by changes of climate, and so on, en masse. This certainly appears to be the case in local, insular, or geographical races, varieties, or species. What affects one affects all the individuals in a given area isolated by mountain barriers or other natural boundaries. Where natural selection appears to act is in the case of protective mimicry. The initial causes are changes in the amount of light, of shade, heat, and other physical agents, yet natural selection appears to be operative in bringing out the wonderful cases of mimicry

so well known. (See MIMICRY.) While therefore the Neo-Lamarckian readily acknowledges that natural selection results after new variations have arisen, there are those who, like the Rev. Mr. Henslow, maintain that in the case of seedlings natural selection is not concerned in bringing about the survival of the fittest, adding: "*A seedling survives among others solely because it is vigorous.*" He claims that as soon as a large number of seedlings appear aboveground, "natural selection at once steps in, so to say, with the result that all those with too weak a constitution to maintain themselves fail to withstand the struggle for existence and to come to maturity, the stronger plants only proving themselves the best fitted to survive. This process of selection, however, is quite independent of any modifications in morphological structure, by which 'varieties' or subspecies are alone recognized." The fact that the majority of offspring always perish in infancy he calls "constitutional selection."

(7) Darwin expressly regarded most variations as indefinite, chance, fortuitous, spontaneous, or promiscuous, "survival of the fittest," as Romanes expressed it, "becoming the winnowing fan, whose function it is to eliminate all the less fit in each generation, in order to preserve the good grain, out of which to constitute the next generation. And as this process is supposed to be continuous through successive generations, its action is supposed to be cumulative, till from the eye of a worm there is gradually developed the eye of an eagle." Other variations Darwin called "definite." In the chapter of his *Variation of Animals and Plants under Domestication* entitled "Direct and Definite Action of the External Conditions of Life" he says: "By the term definite action, as used in this chapter, I mean an action of such a nature that, when many individuals of the same variety are exposed during several generations to any particular change in their conditions of life, all or nearly all the individuals are modified in the same manner." This appears to be practically the same view as that which was advanced by Lamarck and which is called by Eimer "orthogenesis" (q.v.).

Variation as the result of changed conditions is in nearly every case—perhaps four-fifths of all that occur, thus leaving very little scope for the play of chance or fortuitous variations—due to causes of which we are ignorant. Fortuitous variations, in fact, are an almost negligible quantity. Hence the primary postulate of natural selection that variations are in general fortuitous is in the nature of an assumption and not based on observed facts. As the result of recent investigation we are coming more and more to the view that variation in general is the result of the action of changed conditions of life, conditions both physical and biological, and that natural selection is not an active agent.

(8) Since Darwin called attention to the lack of long series of intermediate links between species, naturalists have been more and more inclined to the belief that such series of connecting variations have never existed, but that nature makes leaps, that species often arise by sudden or quick or saltatorial evolution. Certainly neither in the Paleozoic or later strata nor at the present time do we observe these series of minutely graduated numberless annectent forms postulated by Darwin, there still being gaps between the known connecting links. Hyatt, W. H. Dall, Galton, De Vries, and many others have advocated the view of the rapid or sudden modification of structure involving the sudden appearance of species, especially in Paleozoic times. This is seen by the results of the examination of the Steinheim forms of *Planorbis* and of the Tertiary forms of Austrian *Paludina*, where there are often wide gaps even between the connecting links. The new species of evening primrose raised by De Vries originated suddenly, without preparation or intermediate forms. (See MUTATION.) In the great variations observed by C. C. Adams in the forms of the fresh-water snail *Io*, peculiar to the upper tributaries of the Tennessee River above Chattanooga, the variations are evidently due to the varying nature of the bottoms of the streams, the rapidity of the current, and the forced isolation of the varieties, the different forms, from smooth to very spiny, being closely correlated to the varying nature of each stream and different sections of each stream from the headwaters to the mouth. In this case there is apparently no action of natural selection, but a direct response to the environment, and the gaps may thus be either marked or slight. In the hundreds of subvarieties of *Helix nemoralis* the gaps or intervals between such forms are distinct and well marked.

(9) Natural selection is manifestly inadequate to account for the origin of the principal types or classes of plants and animals. They must have appeared with comparative suddenness, as the result of changes of the conditions of life, inducing new needs, new habits, and the origin by exercise of new organs. Thus the types of cœlenterates, echinoderms, crustacea, flying insects, amphibia, reptiles, birds, and mammals were the result of the action of the changed environment, of effort, use, isolation, and heredity, at a time when the ancestral forms were more plastic than their descendants.

(10) Natural selection, it has been claimed, could not have begun to act until the earth had become sufficiently well stocked with plant and animal life to afford materials for competition and survival of the fittest. The first forms of life must have arisen through the operation of the Lamarckian factors. In conclusion it may be said that it still remains an open question whether natural selection is an active or by any means universal agent in evolution. Finally it may be observed that the processes of evolution are in kind like those of simple growth of the individual organism and due to the same factors, and as in ontogenesis there is no one predominant factor, so in phylogenesis there is no one predominant factor, no prepondering mechanism such as has been ascribed to natural selection. In the opinion of some expert working naturalists the greater number of known species have been produced without its aid. It is not of the same nature as artificial selection. Yet the theory is widely accepted, and by its aid Darwin converted the world to a belief in evolution in general.

The views widely accepted as to the relation of natural selection to the other factors of organic evolution may be tabulated thus:

I. Primary factors.

Direct.—Changes of cosmical environment, changes of climate, light, darkness, temperature, dryness, humidity, physical and chemical constitution of the soil and of

waters, mechanical state of the *milieu*, winds, currents of water, biological environment, food, competition, parasitism, symbiosis.

Indirect.—Reaction against cosmical environmental conditions; adaptation, convergence, reaction against biological conditions, mimicry.

II. Secondary factors.

Heredity, vital concurrence, natural and sexual selection, segregation, geographical isolation, amixia, hybridity.

For bibliography, see EVOLUTION.

Germinal Selection. This doctrine, founded by Weismann, is an extension of the general idea of natural selection. To superorganic selection, ordinary individual or personal selection, Roux's theory of histological (histonal) or intracellular struggle for existence, Weismann has added the idea of a struggle among the hypothetical determinants within the germ, or germinal selection. J. A. Thomson has indicated the importance of a form of struggle lying between Roux's histonal selection and Weismann's germinal selection, viz., the struggle between gametes or potential gametes, e.g., between young ova, between sperms, even between ova and sperms. "A vivid realization of this visible struggle," says Thomson, "and the sometimes discriminate selection which it implies, may lead naturally to an appreciation of germinal selection, which deals with the wholly invisible." Although opinions may differ as to the existence of this hypothetical phase of selection, the writer just quoted claims that the theory "justifies itself provisionally as a formula unifying a large number of otherwise unrelated facts of inheritance."

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NATURAL THEOLOGY. The systematic arrangement of that knowledge of the being and attributes of God which may be derived from the consideration of nature and reason. It has had, especially in English thought, two meanings, a wider and a narrower. The first does not differ greatly from what is now called the philosophy of religion. It is the application of the critical principles of science to the assumptions and phenomena of religion. The narrower meaning is the proof of the existence and character of God as shown by the contemplation of nature and especially by the argument from design. This has been the particular meaning of the term for the last century in English theological literature. For all the thought of the Western world the beginnings of natural theology lie in Greek philosophy. Socrates, Plato, and Aristotle taught the existence, the benevolence, and the unity of God by means of the study of nature and human life. The term, however, comes from the Stoics. Augustine (*De Civitate Dei*, vi, 5–12) quotes it from Varro (q.v.). Augustine himself was not averse to the use of reason in the study of the nature of God, as his *Soliloquies* prove. With the Renaissance there was a return to this phase of thought. The first Christian book with this title was the *Theologia Naturalis* of Raymond de Sabunde (1483), which asserts that the revelation in the book of nature is clearer than that in the book of Scripture, since it needs no priests for its interpretation, but only unassisted intelligence. In English thought the deists (see DEISM) first laid emphasis on the value of the study of nature as the basis for religion. They proposed it as a substitute for Scripture, but, as Bacon shows, the same study was already in use for the purposes of sustaining the Christian revelation. Natural theology, he says, "suffices to confute atheism, but not to inform religion." The work of the deists but served to increase attention to natural theology as a proof for Christianity. The Boyle lectures, and later the Bridgewater treatises, were used for this purpose. The greatest book in English on the subject was Paley's *Natural Theology* (1802). This was largely devoted to an argument for the existence of God from the evidences of design in nature. It served as a model for many other books until the statement of the principle of evolution compelled the abandonment of arguments which were based on the conception of God as a skillful mechanician. In America the rationalizing spirit of the New England theology (q.v.) led it to lay much weight upon natural theology, and it was generally made the basis of the system of theology by theologians of this school and by most others during a large part of the last century. The arrangement of topics was usually somewhat as follows: beginning with the principle of causation, which was established as a necessary truth, then followed the arguments for the existence of God, predominantly or exclusively the a posteriori arguments, for a contriver, governor, creator, preserver, and moral governor. The natural attributes of God were deduced, then His moral attributes. The benevolence of God having been proved, the argument could advance to the Scriptures, the inspiration of which was proved by the need of man for revelation and the certainty that a benevolent God would supply so grievous a need. Of late years, largely under the name of the philosophy of religion, a broader and more profound view of the world has produced what in time will be a new natural theology, in the recognition that nature and the course of human history present what may properly be called a revelation of the character of that Final Cause which reason must assume to lie behind the universe.

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NATURAL TONES. A musical term applied to those tones of wind instruments that are produced, without altering the length of the tube (by valves or slides), by increased or diminished force of the air current. The tones thus produced are always overtones of the fundamental tone. But this fundamental tone can be produced only upon instruments having a wide bore in proportion to their length, like the tuba or trombone; whereas the fundamental cannot be produced upon the trumpet, which, consequently, yields only the higher overtones as natural tones. See HARMONICS. Consult E. Ergo, *Dans les propylées de l'instrumentation* (Antwerp, 1908).

NATURE PRINTING. A process by which engravings or plates are reproduced by taking direct impressions of the objects themselves, and printing from them. The process was invented in 1849 by Alois Auer, director of the state printing establishment of the Austrian Empire, and, though very simple, it cannot be applied to any objects except those with tolerably flat surfaces, such as dried and pressed plants, embroidery and lace, and a very few animal productions. The object is placed between a plate of steel and another of lead, both of which are smooth, and polished. They are then drawn through a pair of rollers under considerable pressure, and when the plates are separated it is found that a most beautiful and perfect impression of the object has been made in the leaden plate. This may be used directly as an engraved plate, if only a very few impressions are wanted; but it is too soft to resist the action of the presses for practical purposes; a fac-simile to be used as the printing plate is made in copper by the electrotype process. The inventor published a description of his work in 1854 at Vienna, in which is given a detailed account of the method.

NATURE STUDY. A modern development of the movement of elementary education towards the study of real objects rather than symbols. It arose in response to a demand voiced as early as the year 1845 in America by Horace Mann (q.v.) for early training in the inductive method of thought and in the field of nature.

According to generally accepted ideas on nature study, it must concern itself not only with the common living objects of the child's environment—these the child must be led to examine, to work with himself—but also with the study of lifeless objects and the elementary notions of physical science in so far as they are part of the everyday life of the child. The work must be carried on, so far as possible, to strengthen independence of thought and judgment. The beginnings of the study must be based upon the immediate surroundings of the child, and the field of inquiry may be extended further abroad as the later years of the school are approached. The tasks in the earlier years should be chiefly observational. Nevertheless, the experimental method of study should not be neglected. As far as possible organic forms should be regarded as living things capable of activity and change; the point of view should therefore be dynamic—a matter of great pedagogic importance. The plan of the work may properly be made out so as to include the commoner animals and plants and the everyday phenomena of inorganic nature. Duplication of work should be avoided by increasing the difficulty of the problems and basing them on different material. It is better to study the materials comparatively as far as possible, so that pupils may learn to discriminate and to form general notions. The exhaustive study of one type is of much less value. Outdoor work should be done; in addition to gardening, studies of the habits and haunts of animals, the appearance and disappearance of the birds, the relations of insects to plant life, the appearance of trees in summer and winter dress, and numerous other similar topics may form the basis of study. It is also considered desirable so far as possible to correlate the studies of animals with the studies of physiology and hygiene, especially in its application to human needs. Another subject with which nature study has more recently been connected is geography. It is highly important that the materials should be abundant, that the teacher be not too closely tied to a detailed plan of work, and that he be resourceful in the matter of making the most of what is available.

Nature study as a school subject has been promoted in England by the School Nature Study Union, organized in 1903, and in the United States by the American Nature Study Society, established in 1908.

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NATURE WORSHIP. The worship of all things in nature, including the elements, celestial bodies, plants, animals, and man.

Facts of Nature Worship. The worship of the elements does not seem to occur in the most

primitive religions; in later stages, however, the elements often become the objects of religious regard. Mother Earth has been worshiped by many peoples; the winds are revered even in relatively primitive society. The east wind, a malevolent god among the modern Hindus, was a beneficent Mexican deity. The Yukaghir distinguish 22 directions, all of which are sacrificed to. The worship of fire, not uncommon elsewhere, has reached its culmination in the cults of Mazdaism. Celestial bodies were deified in primitive as well as highly civilized communities. The Hottentots worship the moon and the dawn; sun worship was practiced by the ancient Iroquois, is found among the Indians of the Plains, the Tsimshian of the northwest coast of America, and reached a high state of development among the Mexicans and Peruvians. While even the primitive Australians address appeals to the sun and the lightning, the sun was also a Hindu deity; among the Dravidians it appears as a malignant demon, while it is deemed beneficent among the Munda; the Babylonians were sun worshipers, while in Persia the sun became the centre of the elaborate Mithra cult. The sun is represented in many religions, as in India, under the figure of a bull or horse or bird, or as riding in a car dragged by seven steeds, or as having rays. Sun and moon are the goal of souls in several religions, such as the Polynesian and Hindu. The Egyptians worshiped at the shrine of the sun god Re; they also deified the moon (identified with the ibis god Thoth) and Sirius (often identified with Isis). Among their deities were also the constellations, "the never-resting ones," and the circumpolar stars, "the imperishables." Important as the celestial bodies thus prove to be in worship and cult, they played an even more conspicuous rôle in mythology (q.v.), their precise position and functions in that vast domain having given rise to innumerable theories and speculations.

Stones were worshiped among the Lapps, Finns, African negroes, and South Sea Islanders. Among these sacred stones some are huge rocks, others have shapes suggesting animals or man, still others are heavenly stones. The latter were known to the Greeks and Romans and are still worshiped in many places. A special form of stone worship is fetishism (q.v.), a term more commonly applied to the worship of artificial objects. While Africa is recognized as the classic land of fetishism, the cult is not unknown elsewhere. Witness the animal fetishes of the Zuñi. The medicine bundles of the Plains Indians are also practically fetishes. In central Australia, among the Aranda, we find the sacred stone churinga, associated with their totemism. As a modern survival of stone worship may be regarded the belief in the magic powers of precious stones.

Plants and trees are worshiped as totems, or because they are useful or beautiful or fearsome or symbolic of a sacred object or being. They may be holy in themselves or as dwelling places of spirits. The soma plant in India as well as the coca of Peru are worshiped for their intoxicating qualities. In northern Australia and parts of the Torres Strait islands and Melanesia plants often occur as totems. Many varieties of trees are held in veneration in India, such as the karani tree, the fig tree, the sal or sakhu, the yand tree, the mahwa, the cotton tree, coconut, mimosa, etc. The plants of the fields, usually as harboring spirits of fertilization, were worshiped in primitive communities as well as by the peasants of Europe, among whom traces of these cults can still be found.

Primitive mentality draws no sharp line between man and animal. Among North American Indians, e.g., human qualities are constantly attributed to animals. Transmigration of human souls into animals was believed in in India and Egypt and among the South African Bantu and many other peoples. The mythological creatures of central Australian mythology are interchangeably animals and men. On the northwest coast, or among the Eskimo, men are believed to transform themselves into animals by putting on animal skins; similarly, animals become men by throwing off their skins. Animals are worshiped as ancestors in totemic communities and elsewhere. At Bubastis, in Egypt, where the cat-headed Bast was worshiped, vast cemeteries of mummified cats were discovered; similar cemeteries, dedicated to other animals, were found in other parts of Egypt. Animal taboos, involving various degrees of veneration for the tabooed animals, are practically universal in primitive society and survive, without the veneration, in modern culture. Animals as guardian spirits are indigenous in North America as well as in parts of Polynesia.

Of all animals the snake is perhaps the one most frequently adored. The snake appears to have been worshiped in every land, either as a soul receptacle or friendly house snake, in whose body resides the soul of an ancestor (as in Rome and India), or as a healing and mantic power of wisdom (as in the cults of Babylon and Greece), or as an evil spirit, world snake, or dragon. The negroes of Africa, the Dravidians and American Indians, the Mexicans and Peruvians, Egyptians, Greeks, Romans, and Semites regarded the snake in one or another of these forms as a divine animal. The dragon of the Eddas is evil, he is the Midgardswurm that embodies destruction, like the rain-preventing dragon Vritra of the *Rig-Veda;* but beside the latter stands the figure of the Dragon of the Deep, to whom the Vedic Aryan prays as to a beneficent divinity. So Apollo as a healing god is associated with Æsculapius' snake, but destroys the Python. Among the Mongoloid Naga tribes, as among the Chinese, the dragon snake is a world divinity. Snakes are also often associated with phallic worship.

Man, finally, is revered as an ancestor or as a great chief or medicine man. The Romans had their divine emperors, the Egyptians their pharaohs. Priests and kings are divine in modern India, China, and Japan.

Theories of Worship. Max Müller and other writers of the naturalistic school of mythology posit the adoration of nature as a fundamental and primary fact. Nature, with its innumerable wonders, surprises, elemental forces, must even have aroused the respect, the awe, the adoration of primitive man. Taking so much for granted, Max Müller attempted to reconcile this primitive adoration of nature with the worship of personal deities such as he found it among the peoples of classical antiquity. Müller used a linguistic method of proof. A comparative analysis of many words belonging to the Indo-European group of languages, including their Sanskrit originals, led to the establishment of a set of primary words which, in turn, proved to be resolvable into a number of fundamental

primitive roots. These roots seemed to refer to actions such as walking, standing, sleeping, rising. Now, argued Müller, these were the only linguistic tools with which man, in those remote times, could operate. Hence, when the need arose to refer to the objects and powers of nature, which to him was of such great concern, man used these roots, although their meanings were saturated with human values and, in many instances, did not at all fit the processes of nature. In the course of time the use of a vocabulary born of human associations led to the personification of natural phenomena. It also occurred that one phenomenon in its different phases was designated by separate words. As an attempt to reconcile in imaginative tales these often contradictory designations, mythology arose. The most complete formulation of Max Müller's theory is contained in an essay on *Comparative Mythology* (1856), reprinted in his *Chips from a German Workshop*, vol. ii.

A radically different theoretical position was assumed by E. B. Tylor (*Primitive Culture*, 1871) and Herbert Spencer (*Principles of Sociology*, vol. i, 1876). These two writers represent the main exponents of the doctrine of animism (q.v.). Their method of deriving and interpreting the primitive theory of spirits has been explained in another place. Here we shall note only the difference between Tylor's and Spencer's treatment of the subject in so far as the former, having arrived at the human spirit, proceeds to explain the origin of animal, plant, and nature spirits by an analogous argument, whereas the latter ignores the independent existence of all spirits other than human, conceiving the spiritualization of animate and inanimate nature as a process of extension of the idea of a human spirit. Spencer and Tylor agree in regarding the worship of the dead as the earliest religious cult. Further than that, however, Tylor does not go, his concern being with the history of the animistic faith from most primitive times up to the present day, rather than with the evolution of religious beliefs and rites. The latter task is undertaken by Spencer, who, positing ancestor worship (q.v.) as the earliest form of religion, proceeds to derive from it all other forms of cult and worship. He suggests three processes which must have led to animal worship. Animals which haunt houses are readily conceived as possessed by the souls of the departed and will therefore be regarded as sacred. The same is true of animals often seen in the vicinity of graves. But the principal source of animal worship Spencer sees in a process designated by him as the misinterpretation of nicknames. Savages are wont to give each other animal names. Subsequently, when the ancestors of individuals are referred to in conversation by their animal names, a misunderstanding readily arises. The primitive mind does not easily distinguish between a name and the thing named; a crude and indefinite language, moreover, does not permit the savage to avoid or correct errors of understanding. Hence the animal-named ancestors soon come to be conceived as real animals, and as such they are worshiped. Even the ascription of human characteristics to animals, so common in primitive culture, Spencer explains as due to the fact that man and animal are believed to have had a common ancestor. When animal appellations begin to recede before an advancing culture, cases will occur where one of the ancestors will be conceived as human, the other as animal. Thus arises the belief in and the worship of monsters with mixed human and animal traits. Still later, finally, when human names completely replace animal nicknames, ancestors no longer lose their true characters and are worshiped as human. The worship of plants and of inanimate nature Spencer explains on similar lines.

A systematic presentation of W. Wundt's position (*Völkerpsychologie, Mythus und Religion*, vol. ii) cannot be given here, but the main points of his system may be briefly summarized. The lowest layer of religious belief is constituted by a faith in souls, human souls. This, according to Wundt, is the most primitive form of animism. The belief in magic developed from the contact of man with those aspects of nature which strike him as strange, exceptional, frightful, awe inspiring, such as floods, storms, thunder and lightning, etc. While thus the belief in magic has its own psychological sources, it presupposes a preëxisting animism without which it could not develop. The most primitive cult, also based on animism, is fetishism, the belief in particular powers exercised by specific, usually artificial, objects. Wundt regards fetishism as a universal stage in the development of religion through which all mankind must have passed. Another outgrowth of animism is totemism, which Wundt conceives as the most characteristic form of animalism, or animal worship, the totem appearing in two typical varieties, as ancestor and as guardian spirit. The second variety of totemism is a later form, which constitutes a link between animal worship and the worship of human ancestors, or manism. Thus Wundt shares Spencer's opinion that in the ancestral cult the animal preceded man. In Wundt's system, however, the worship of human ancestors constitutes a relatively late phase of religious development.

A recent highly original contribution to the theory of religion and worship we owe to Emile Durkheim (*La vie religieuse*, Paris, 1912). The French sociologist rejects all theories of religion which, in the last analysis, are based on illusions, such as dreams, the echo, etc. There must exist a reality, asserts Durkheim, from which all religion draws its source. The fundamental fact in religion is the division of experience into sacred and profane. The problem then consists in ascertaining the root of this dichotomy of experience. Durkheim bases his argument on an intensive analysis of totemism as found in Australia. He tries to show that totemism embraces all the elements characteristic of the higher religions and is therefore a true religion. Now, in the totemic complex of beliefs and practices, the worship is really directed, not to the totemic animals or the members of the clan or the totemic symbols, but towards a mysterious power, the totemic principle, which pervades all that is sacred, all else being profane. Durkheim identifies the totemic principle with mana, the magic power (see MAGIC), a belief which supersedes the totemic principle among tribes that have passed out of the totemic stage. An analysis, finally, of mana or the totemic principle leads to the discovery of the reality underlying religion. The savage, in Durkheim's case the Australian, is aware of two radically distinct cycles in his experience: on the one hand there is the monotonous round of everyday activities, on the other the exciting

and strange phenomena of ceremonial life. On ceremonial occasions the individual lives on a different plane, his emotions, thoughts, acts altogether transcend the level made familiar by daily routine. The individual feels himself actuated by a superior and irresistible power. Behind that power, although unrealized by the savage, is society, the clan, social pressure. Such, then, is the reality underlying religion, it is society itself; for the power by which the individual feels himself to be actuated becomes the source of the sacred.

Viewpoint of Ethnology. While all of these theories contain thoughts and suggestions of interest to the student of culture, not one can be accepted in its entirety. Recent advances in ethnological knowledge and important modifications in the methods of research have resulted in an attitude of extreme caution in all problems of origins and developments. Our conclusions also are less ambitious, if perhaps more reliable.

Müller's and Spencer's philological arguments have long since been discarded. While the comparative study of word roots is of inestimable value for tracing linguistic relationships and often proves a precious guide in the study of the migrations and contact of peoples, a theory of religion and mythology which represents religious emotion and mythological concepts as secondary developments based on linguistic processes is doomed to failure. Similarly, Spencer's theory of the misrepresentation of nicknames falls to the ground as soon as analyzed in the light of modern linguistic work among primitive peoples. The reconstruction of primitive languages, with their rich vocabularies and often enormously complex grammars, forbids all thought of misapprehension such as Spencer assumed to lie at the root of animal worship. Another tendency shared by Spencer with many writers of his day was one towards monogenetic explanations: all spirits are human in origin and become secondarily associated with animals, plants, inanimate objects; ancestor worship is the one primitive cult to which all later cults are more or less remotely related. Neither historical nor psychological considerations permit us to limit the origin of spirit and the origin of worship to one out of many possible sources. With reference to ancestor worship (q.v.), Wundt is certainly right as against Spencer in regarding it as a relatively late form of worship and rite, although a more primitive cult of the immediate dead seems to be rooted in the remotest antiquity. In Spencer's as well as in Tylor's presentation the process of development of religion appears as a distinctly individualistic and rationalistic one; they overlook the effect of the social setting on individual experience and entirely overestimate the importance of conscious intellectual processes in situations where subconscious and emotional complexes play the leading rôle. In this latter respect Wundt's work stands on a distinctly higher plane than that of his English forerunners. His treatment of the development of religious phases, on the other hand, remains highly schematic and must be rejected. We may not accept his fetishism and totemism as universal stages in the evolution of religion; nor has Wundt given satisfactory proof of his categorical assertion that animal ancestor worship must have preceded the worship of human ancestors. In Durkheim's system, finally, due attention is given to the social setting; unfortunately, however, the author abandons one extreme for another and altogether disregards individual experience and initiative in his account of the origin of religious sentiment. (Consult A. A. Goldenweiser's review of Durkheim in the *American Anthropologist*, 1915.) Durkheim's identification of the totemic principle with *mana* (see MAGIC) runs counter to all ethnological evidence, while his attempt to derive the category of sacredness from the reaction of the individual consciousness to social pressure will scarcely be found to conform to either primitive or modern experience of religious phenomena.

Before closing it will be well to formulate a few general conclusions which seem justifiable at the present stage of our knowledge of the phenomena of worship. We must assume that the various forms of worship and rite have had a variety of historical and psychological origins; hence any attempt to derive all forms of religion from some one source, no matter how plausible logically or even psychologically, must needs fall far off the mark. The same is true of religious developments. In studying these we observe divergent and convergent phenomena: beliefs and rites, although genetically related, develop in different directions, resulting in highly disparate objective and psychological features; on the other hand, originally distinct lines of religious or ritualistic evolution converge towards forms which display considerable, sometimes great, similarities. Amid the maze of convergences and divergences striking parallelisms occasionally occur, although these never refer to phenomena that are highly complex or greatly extended in time. In innumerable instances the religious situation at a given place and time cannot be understood unless the contact of peoples is taken into consideration. While the social and, speaking more generally, the cultural setting is of paramount importance as a codeterminant of religious phenomena, the individual differences as well as the specific experiences of individuals must not be neglected if proper perspective is to be preserved. This applies with especial force to religion, as in this domain the rôle of individual initiative seems ever to have been particularly significant. While the current terms used for the designation of religious phenomena, such as god, magic, totemism, animal worship, etc., probably serve their purpose as well as any, one must ever remember that under any system of nomenclature highly heterogeneous complexes must needs be designated by the same terms; thus, totemism, e.g., is in North America colored by guardian-spirit ideas, whereas among the African Bantu it is related to the taboo concepts current among those peoples.

While modern insight thus tends to discourage sweeping generalizations or undue implications in dealing with the phenomena of religious worship, some forms of belief must certainly be recognized as bearing the marks of great primitiveness or universality or of both. Among these must be noted animism, the belief in souls and spirits, which certainly is as primitive as it is universal; the belief in magic power, which is as universal and probably as primitive as animism; the general human tendency to experience vague and undifferentiated but at least potentially religious emotions when coming in contact with striking phenomena of nature. Other phenomena of worship, on the other hand,

clearly do not belong to the most primitive religious manifestations and are also limited in their distribution. Among these we must include ancestor worship in general and the worship of human ancestors in particular. Here also belongs fetishism, the belief in particular powers associated with specific, usually artificial, objects. Fetishism, it seems, in part fuses with, in part is independent of, animism. Totemism, finally, must also be classed as a form of worship which is neither primitive nor universal, consisting as it does in an association of a particular form, or rather of several forms, of animal worship with a special form of social organization which has itself but a limited distribution and can certainly not be regarded as primitive. Animal worship, on the other hand, which, it will be seen, is by no means coextensive with totemism, is again a practically universal and probably fairly primitive form of belief. Identification of man and animal and transformation of one into the other are most characteristic traits of primitive belief. These identifications and transformations, the primary source of which must lie in the obvious physical and psychic similarities between man and beast, constitute the favorite theme of all mythologies.

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NAUCK, nouk, JOHANN AUGUST (1822–92). A German classical scholar. He was born at Auerstedt and, after studying at the University of Halle, taught at several Gymnasiums at Berlin until about 1859, when he became member extraordinary of the Imperial Academy of Sciences at St. Petersburg. He remained in that city until his death. His best-known works are: *Aristophanis Byzantii Grammatici Alexandrini Fragmenta* (1848); a text edition of the complete works of Euripides, with the fragments (1854; 3d ed., 1871); *Studia Euripidea* (1859–62); an annotated edition of Sophocles (*Sophoclis Tragœdiæ*), based upon Schneidewin (1867); Homer's *Odyssee* (1874) and *Ilias* (1877–79); *Iamblichi de Vita Pythagorica Liber* (1884); select works of Porphyrius, *Porphyrii Philosophi Opuscula Tria* (1860; 2d enlarged ed., *Opuscula Selecta*, 1886); and his greatest work, *Tragicorum Græcorum Fragmenta* (1856; 2d ed., 1889; with the *Tragicæ Dictionis Index*, 1892). The last work is considered the standard edition. Consult J. Zielinski, *August Nauck* (Berlin, 1894), where his writings are enumerated, and J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

NAU'CRATIS (Lat., from Gk. *Naúkratis*). An ancient city of Egypt, situated on the Canopic branch of the Nile, near the modern Nebîreh, 53 miles southeast of Alexandria by rail. The site was discovered in 1884 by Petrie. Under King Amasis II it was the only place in Egypt where Greeks were allowed to settle and trade, and thus became a very flourishing Greek colony. The most prosperous period of the city was from 570 to 525 B.C. The excavations, which centred chiefly about the sites of the temple of Apollo and Aphrodite, brought to light evidences of the other temples mentioned by Herodotus and Athenæus. Of particular interest is the material discovered bearing on the history of ceramics and epigraphy. On the successful excavations of Petrie, consult his *Naucratis* (London, 1886–87). Petrie thinks that the Greek settlements at Naucratis may date from as early a period as 650 B.C. Consult: W. M. Flinders Petrie, "Naukratis I," and E. A. Gardner, "Naukratis II," in *Egyptian Exploration Fund, Publications*, vols. iii, vi (London, 1886–88); D. G. Hogarth, in *British School at Athens, Annual* (ib., 1898–99); id., "Naukratis, 1903," in *Journal of Hellenic Studies*, vol. xxv (ib., 1905).

NAUCY'DES (Lat., from Gk. *Naukýdēs*), called OF ARGOS. A Greek sculptor of the fifth century B.C. He was trained in the manner of Polyclitus I and was the master of his brother Polyclitus II. A Discobolus now in the Vatican is believed to be a copy of a work by him. A gold and ivory Hebe and statues of Hecate, Hermes, Erinna the poet, and some groups of athletes are mentioned by writers of his time and a later period as works of this sculptor.

NAUDET, nō'dā', JOSEPH (1786–1878). A French historian, born in Paris. He was made professor of Latin poetry at the Collège de France in 1821 and was director of the Royal Library from 1840 to 1860. He was also a member of the Academy. His works include: *Histoire de la guerre des esclaves en Sicile* (1807); *Histoire de l'établissement, des progrès et de la décadence de la monarchie des Goths en Italie* (1811); *La conjuration d'Etienne Marcel* (1815); *De l'administration des postes chez les Romains* (1863).

NAUGATUCK, nạ'ga-tŭk. A town and borough (coextensive) in New Haven Co., Conn., 5 miles south of Waterbury, on the Naugatuck River and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, C 4). It has the Whittemore Memorial Library, the splendid Whittemore Memorial Bridge, spanning the river here, Salem School, Naugatuck High School, and noteworthy business blocks, and is engaged extensively in manufacturing India-rubber goods, knit underwear, malleable iron, copper goods, gas and electric fixtures, and paper boxes. Naugatuck was first incorporated in 1844 as a town, and in 1893 as a borough; consolidation was effected in 1895. The government, under the charters of 1893 and 1895, is administered by a board of warden and burgesses, annually elected, which has powers of appointment in all borough offices excepting the board of education, chosen by popular vote.

Pop., 1900, 10,541; 1910, 12,722; 1914 (U. S. est.), 13,651; 1920, 15,051.

NAUHEIM, nou'hīm. A noted watering place in the Grand Duchy of Hesse, Germany, on a slope of the Taunus Mountains, at the foot of which flows the Usa, 17 miles north of Frankfort (Map: Germany, C 3). The Kurhaus is surrounded by beautiful grounds. The waters, ranging in temperature from 86° F. to 95° F. and containing salt, iron, and carbonic acid, are used for both drinking and bathing. Considerable quantities of water are exported. Cooking and bathing salt is extracted. The place is visited annually by about 34,000 patients. Pop., 1900, 4501; 1910, 5694.

NAULETTE, nō'lĕt'. A cavern on the Lesse in the Commune of Furfooz, near Dinant, Belgium. Here, in 1866, Dupont found a human lower jaw associated with bones of the elephant and rhinoceros. The Naulette man is now assigned to the Mousterian epoch. See PALEOLITHIC PERIOD.

NAUMACHIA, nạ-mā'kĭ-ȧ (Lat., from Gk. *ναυμαχία*, naval battle, from *ναῦς*, *naus*, ship + *μάχεσθαι*, *machesthai*, to fight). Among the Romans, a mock naval battle, also the place used for this purpose. Julius Cæsar was the first to introduce a naumachia into Rome (46 B.C.), causing a portion of the Campus Martius to be transformed into a lake. Augustus made an artificial lake (*stagnum*) near the Tiber for the same purpose, which was afterward frequently used for naumachiæ. Claudius also gave an exhibition of the kind on Lake Fucinus, in which 19,000 combatants took part. These naumachiæ were not sham fights, any more than ordinary gladiatorial combats were sham contests. Both sides fought in real earnest until one was utterly overpowered. The crews consisted of gladiators, prisoners, or condemned criminals. Consult the article "Naumachia," in William Smith, *A Dictionary of Greek and Roman Antiquities*, vol. ii (3d ed., London, 1891), and Ludwig Friedländer, *Roman Life and Manners under the Early Empire*, vol. ii (7th rev. ed., New York, 1909).

NAUMANN, nou'mȧn. A family of German musicians. JOHANN GOTTLIEB (1741–1801), the most famous member, was born at Blasewitz, near Dresden. He studied under Tartini, Padre Martini, and others and became court composer at Dresden in 1764. In 1766 he was appointed kapellmeister at Dresden. He produced many operas and in 1777 organized the royal orchestra of Stockholm, Sweden. He made several tours throughout Italy and Prussia and was regarded as one of the most important composers of his time. He wrote over 20 operas, 10 oratorios, 18 symphonies, and numerous smaller works, instrumental and vocal. Consult: Meissner, *Bruchstücke aus Naumanns Lebensgeschichte* (Prague, 1803–04).—His grandson, EMIL (1827–88), studied under Von Wartensee and Mendelssohn and at the Leipzig Conservatory. He was chiefly famous for his valuable and scholarly writings, particularly with reference to Church music, and was also the composer of an oratorio, *Christus der Friedensbote* (1848), and the opera *Judith* (1848). Among his more important works are: *Die Tonkunst in der Kulturgeschichte* (Berlin, 1869–70); *Musikdrama oder Oper* (1876); *Illustrierte Musikgeschichte* (1880–85). He lectured on musical history at the conservatory at Dresden.—KARL ERNST (1832–), another grandson of Johann Gottlieb, became favorably known for his writings and compositions. He was born in Freiberg, Saxony, and received his musical education in Leipzig, completing his musical studies with a two years' period of organ study under Schneider of Dresden. His compositions are principally chamber music, and so far as is known he may be said to have written the first sonata for viola and pianoforte.

NAUMANN, (JOSEPH) FRIEDRICH (1860–1919). A German publicist. He was born at Stormthal, near Leipzig, and was educated at Leipzig and Erlangen universities. In 1883–85 he was assistant at the Hamburg Rauhe Haus (reformatory) and from 1886 to 1890 was pastor at Langenberg. He held other posts as a clergyman, but in the middle nineties gave up the ministry, became a leader of the left wing of the Christian Socialist party, was one of the founders and first president of the National Socialist party, and edited *Die Zeit* (1896–1903; then coalesced with *Die Nation*), the political periodical *Hilfe* (1901–07), and an annual of the party called *Patria*. Heidelberg University gave him an honorary D.D. in 1903. He was elected to the Reichstag in 1907, but failed of reëlection in 1912. Among his many books are: *Der soziale Progress der evangelischen Kirche* (1890); *Was heisst Christlich-sozial?* (1894–96); *National-sozialer Katechismus* (1896); *Weltpolitik und Sozialreform* (1898); *Flotte und Reaktion* (1899); *Demokratie und Kaisertum* (1900); *Kunst und Volk* (1902); *Briefe über Religion* (3d ed., 1904); *Neudeutsche Wirtschaftspolitik* (1906); *Freiheitskämpfe* (1911); *Geist und Glaube* (1911).

NAUMANN, JOHANN FRIEDRICH (1780–1857). An eminent German ornithologist. He was born at Ziebigk, worked with his father, J. A. Naumann, also an ornithologist, and became professor and inspector of the ornithological museum of the Duke of Anhalt-Köthen. He was a clever draftsman and himself engraved the plates for the illustrations of his *Naturgeschichte der Vögel Deutschlands* (12 vols., 1822–44), a standard work. He was also a skillful taxidermist and mounted the best collection (of local birds) of his time. Naumann wrote, besides: *Taxidermie* (1815; 2d ed., 1848); *Ueber den Haushalt der nördlichen Seevögel Europas* (1824); *Die Eier der Vögel Deutschlands* (1819–28), with Buhle. In honor of Naumann and his father the German Ornithological Society named its journal *Naumannia*.

NAUMANN, KARL FRIEDRICH (1797–1873). A German mineralogist and geologist, born in Dresden. He studied at the Freiberg School of Mines and at the universities of Jena and Leipzig and in 1821 made a journey to Norway for scientific purposes. After his return he became an instructor at Jena (1823). A year later he was called to be professor at Leipzig. During the period 1826–42 he held the chair of mineralogy and geognosy at Freiberg, then returned to Leipzig, where the last 30 years of his academic career were spent. Among his writings are: *Anfangsgründe der Kristallographie* (1841; 2d ed., 1854); *Elemente der theoretischen Kristallographie* (1856); *Elemente der Mineralogie* (1846; 14th ed., 1901).

NAUMBURG, noum'bụrk, or NAUMBURG-ON-THE-SAALE. A town in the Province of Saxony, Prussia, situated on the Saale, 30 miles southwest of Leipzig (Map: Germany, E 3). Its

cathedral of Sts. Peter and Paul has four towers and many statues, paintings, monuments, and other specimens of early German art. Other noteworthy old buildings include the town hall and the castle. There are a Gymnasium and a Realschule. The town manufactures woolens, soap, leather, combs, stockings, brushes, toys, and ivory goods. Much sparkling wine and beer are produced. Glass and porcelain painting is also an important industry. In 1029 Naumburg became the seat of the bishopric of Naumburg-Zeitz. Pop., 1910, 26,962.

NAUNTON, nąn'ton, Sir Robert (1563–1635). An English politician, born at Alderton, Suffolk. In 1582 he graduated B.A. from Trinity College, Cambridge, where he became a fellow in 1585 and public orator in 1594. He then traveled on the Continent, furnishing information on the political condition of Europe to the Earl of Essex, but resumed his duties of public orator in 1600. He became a member of Parliament for Helston in 1606, was chosen for Camelford in 1614, and represented the University of Cambridge in the Parliaments of 1621, 1624, and 1625. In 1618–23 Naunton was Secretary of State through the influence of the Duke of Buckingham, and thereafter until shortly before his death was master of the court of awards. His *Fragmenta Regalia,* which gives an account of Queen Elizabeth's courtiers, was left by him in manuscript. First published in 1641, a new edition, edited by Edward Arber, appeared in 1870.

NAUPLIA, nąˊplē-ą. A town of Greece, the capital of the Nomarchy of Argolis, 7 miles southeast of Argos, on the Argolic Gulf (Map: Greece, D 6). It is the seat of an archbishopric and has railroad connection with Corinth. The impregnable situation of its harbor, protected by strong fortresses, renders it of great strategic importance. The principal sights consist of the Museum, the Acronauplia or ancient acropolis, and the Palamidi, a fortification originally constructed by the Turks and later strengthened by the Venetians, which is at present utilized as a prison. Owing to its advantageous situation and spacious harbor, Nauplia is of some prominence commercially. It has ordnance factories and naval yards. From 1829 to 1834 it was the capital of Greece. In mediæval times Nauplia was one of the leading cities of the Peloponnesus. Here in 1831 Capo d'Istria, the President of the Republic, was assassinated. Pop. (commune), 1907, 12,176.

NAU'PLIUS (Lat., sort of shellfish, which sailed in its shell as in a ship, from Gk. *ναῦς, naus,* ship + *πλεῖν, plein,* to sail). A larval stage in the development of certain crustaceans. See Metamorphosis, and Plate of Barnacles.

NAU'SEA (Lat., from Gk. *ναυσία, nausia,* seasickness, disgust, nausea, from *ναῦς, naus,* ship). A distressing sensation always referred to the stomach. It is unattended by pain, but is usually accompanied by a feeling of general languor or weakness, a small and often irregular pulse, a pale, cool, and moist skin, general muscular relaxation, an increased flow of saliva, and a sensation that vomiting will supervene. It is most commonly a *direct* symptom of disease or disorder of the stomach, but sometimes it is a very important *indirect* symptom of disease of some part at a distance from the stomach—as, e.g., the brain or the kidney. The nausea of pregnant women is due to reflex irritation excited by the enlarged uterus. Among the more common causes of nausea (which may or may not be followed by vomiting) may be mentioned fainting spells, the taking of a general anæsthetic, and disturbances of equilibrium affecting the eyes or internal ear, e.g., car sickness and seasickness. It may be provoked by blows upon the head, abdomen, testicles, or ovaries, or by powerful mental impressions such as revolting sights, odors, or sounds, and sudden fright. Other causes are discussed under Vomiting.

NAUSHON, nąˊshŏn'. One of the Elizabeth Islands (q.v.).

NAUSICAA, nô-sĭkˊă-ȧ (Lat., from Gk. *Ναυσικάα, Nausikaa*). In the *Odyssey,* vi–viii, the daughter of the Phæacian King Alcinoüs. When Odysseus is wrecked on the coast of Scheria, her father's island, she discovers him and conducts him to her father's court.

NAUTCH, nąch (Hindi *nāch,* Prak. *nachcha,* from Skt. *nāṭya,* dance, *nṛitya,* dancing, acting, from *nart, nṛit-,* to dance). The term applied, especially in northern India, to the dancing girls attached to the temples. The corresponding word in the south of India is bayadere (q.v.). The presence of these girls at temples and their double rôle of attendants on the deity and of courtesans is undoubtedly a survival of the custom formerly widespread, especially in the East, of sacred prostitution. The daughters of nautch girls are generally trained as successors of their mothers. As in like religious customs elsewhere, no social odium attaches to these women. The nautch dancers are completely enveloped in winding drapery, and move with slow and rhythmic motions of the body, while the hands are busied in graceful gesturing or management of drapery. The feet are little used. The nautch dance is primarily erotic in character, and now is often regarded by the natives as symbolizing the loves of Krishna (q.v.) and the milkmaids. See Bayadere.

NAU'TICAL AL'MANAC (from Lat. *nauticus,* from Gk. *ναυτικός, nautikos,* pertaining to ships or sailors, from *ναύτης, nautēs,* sailor, from *ναῦς, naus,* Skt. *nāu,* ship). A volume issued annually and containing primarily the astronomical data required by navigators in the computation or reduction of the sextant observations by which the ship's position at sea is ascertained. The preparation and publication of these almanacs is very costly, and is therefore undertaken as a work of public utility by several different governments. Thus, the United States issues the *American Ephemeris and Nautical Almanac;* Germany, the *Berliner astronomisches Jahrbuch;* France, the *Connaissance des temps;* and Great Britain, the *Nautical Almanac.* To the astronomer the *Nautical Almanac* furnishes a great mass of important data: it gives the position of the moon in right ascension and declination for every hour and the sun's latitude and longitude for every day in the year; it shows the obliquity of the ecliptic, the sun's and moon's parallax, aberration, etc., at different times; it supplies the necessary data for the determination of the real or apparent size, position, and motion of the planets and their satellites; it fixes accurately the places of the more important stars; and gives full details concerning eclipses, occultations, transits, and other celestial phenomena occurring during the year. It is generally issued two or three years in advance of its date for the sake of mariners going on long voyages. See Almanac.

NAUTICAL SCHOOLS. See NAVAL SCHOOLS OF INSTRUCTION.

NAUTICAL SURVEYING. See HYDROGRAPHY.

NAUTICUS, nȧ'tī-kŭs. See CLOWES, W. L.

NAU'TILOI'DEA (Neo-Lat., from Lat. *nautilus*, from Gk. *ναύτιλος*, sailor, nautilus, from *ναῦς, naus*, ship + *εἶδος, eidos*, form). An order of fossil Cephalopoda, equal in rank to the Ammonoidea, containing about 2500 species that range from Cambrian to recent time, and are represented at present by only two or three living species of the genus *Nautilus*. The most ancient forms were straight conic shells (*Orthoceras*), which soon became coiled like the modern forms. Many of the extinct genera and species are most important horizon markers or index fossils. See CEPHALOPODA; NAUTILUS; ORTHOCERAS.

NAU'TILUS (Lat., from Gk. *ναύτιλος, nautilos*, sailor, from *ναῦς, naus*, ship). The pearly nautilus (genus *Nautilus*) is the only living representative of an immense assemblage of shelled cephalopods of the subclass Tetrabranchiata, which flourished during past geological ages. The shell is coiled in one plane, divided into chambers by partitions or septa, the outermost being called the living chamber, as it contains the animal; the septa are perforated by the siphuncle, which is central or nearly so, and the aperture is wide and spacious. The shell consists of two layers, the outer being porcellanous, the inner pearly, or nacreous, whence the name "pearly" nautilus. The initial chamber consists of an obtuse incurved cone, marked on the outer surface of its posterior wall by a small scar called the cicatrix. It is supposed that a perishable embryonic shell (protoconch) was formed, the presence of which is indicated by the cicatrix.

PEARLY NAUTILUS (*Nautilus pompilius*).
Seen in section showing the chambers and siphuncle. (Half natural size.)

The body is short and thick, divided into a large obtusely conical head bearing eyes, tentacles, ears (otocysts), and a rounded saclike trunk. The mouth is surrounded by about 90 external filiform tentacles. The pair of tentacles on the inner or dorsal side are fused so as to form a hoodlike lobe by which the aperture of the shell is closed when the animal is withdrawn into the living chamber. Beneath is the funnel (hyponome), not forming a completely closed tube as in the squids, but a locomotive organ, through which, as in other cephalopods, the water is ejected with sufficient force to throw the animal backward. In swimming forward, says Kent, the tentacles are extended radially from the head.

The mouth is in the centre of the lobes and groups of tentacles, armed with a tongue (radula) and a pair of remarkably powerful horny jaws tipped with carbonate of lime. Olfactory organs and osphradia are present. The animal is attached within the living chamber by two oval muscles. The compartments of the shell are usually said to be filled with air or gas, but according to Verrill they are filled with sea water, which may be taken in or expelled so as to equalize pressure at varying depths.

Until recently the living nautilus was exceedingly rare, though the empty shells are cast ashore in great quantities in the Pacific and Indian oceans. Yet they have been for a long time trapped in baskets like lobster traps by the natives of some of the Melanesian and Fiji islands and used as food. Willey at Ralum, in New Britain, succeeded in trapping the nautilus in 70 fathoms of water. He also succeeded at Lifu, one of the Loyalty Islands, in capturing specimens at a depth of only three fathoms. These he kept in a large submerged cage, feeding them daily until his efforts were rewarded early in December, 1894, by finding that they had spawned in the cage, yielding an abundance of eggs. These are not laid in bunches, as is the case with those of the squid, but are deposited separately by the female. Each egg is as large as a grape. There are said to be three species now living in the Pacific Ocean, while the number has been carried up to even four. The two better-known species are *Nautilus pompilius* and *Nautilus umbilicatus*.

Fossil Nautili. Although the family Nautilidæ dates from the Jurassic period, the genus *Nautilus* is doubtfully referred to the Tertiary. The order Nautiloidea, however, originated as early as the Ordovician; the earlier types were straight and uncoiled, like *Orthoceras*. Very striking, says Hyatt, is the marvelously sudden rise of the Nautiloidea as a group; it reached its maximum in the Silurian, followed by a decline extending from the Devonian to the Triassic period. Then the forces acting unfavorably upon its existence were arrested, or their violence lessened, and the group has been affected by only very slight changes and an exceedingly slow process of retrogression until the present time.

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NAUTILUS, PAPER. See ARGONAUT.

NAUVOO, nȧ-vōō'. A city in Hancock Co., Ill., 12 miles north of Keokuk, Iowa, on the Mississippi River (Map: Illinois, B 4). It is in a highly productive fruit-growing country, where

the leading industries are wine making and the culture and shipment of fruit for market, particularly grapes and berries. St. Mary Academy and Spalding Institute, conducted by the Benedictine Sisters, are in Nauvoo. The most interesting features in this vicinity are the remains of the old Mormon buildings. The water works are owned by the city. Pop., 1900, 1321; 1910, 1020. Nauvoo was founded by the Mormons in 1839 and rapidly increased in size until in 1846 it had a population of 15,000. In this year the settlement was broken up by the people in the neighborhood. (See MORMONS.) An imposing temple, 128 feet long by 88 feet wide, left unfinished by the Mormons, was destroyed partly by fire in 1848 and partly by a tornado in 1850. In the latter year a company of French communists, called Icarians (q.v.), under the leadership of E. Cabet, occupied Nauvoo, but their experiment proved a failure, and they abandoned it in 1858.

NAVA, nä'vȧ. A seaport of Japan. See NAWA.

NAVAHO, or **NAVAJO**, năv'ȧ-hō. An important tribe of Athapascan stock (q.v.). Their present reservation in northeastern Arizona and extending into New Mexico and Utah comprises nearly 10,000,000 acres, but it is almost entirely an arid desert of sand and rock, unfit for any purpose except scanty grazing. Like other tribes of the same stock, they call themselves simply *Dĭnĕ* (people); they are called *Apaches de Navajo* in Spanish records at least as early as 1630. They came originally from the far northern home of their kindred, but have incorporated elements from all the neighboring tribes. They were roving and predatory in their habits and were continually at war with the Ute and the Plains tribes. They were alternately at war or peace with the Spaniards during the early colonization period, but later became so troublesome that in 1705 and again in 1713 it was necessary to bring them to terms by vigorous invasions of their country. In 1744 Franciscan missionaries attempted to civilize them, but in a few years the effort was abandoned. In 1805, in consequence of continued raids, a Spanish force penetrated their stronghold in Tseyi (Chelly) Cañon and inflicted a severe defeat, killing 115 men, women, and children. The lesson, however, was soon forgotten, and between the fall of the Spanish power about 1815 and the American occupation of the country 30 years later they made the stealing of sheep, cattle, and horses from the Mexican settlements a steady and profitable business. With their booty they were enabled to become a pastoral tribe, and they adopted from the more civilized Pueblos a well-developed weaving art. From the Mexicans they learned the simpler forms of metal working, especially in silver. In 1846 a number of prominent chiefs made their first treaty with the American government, but, on account of the unfortunate killing of the principal signer three years later, the tribe again became hostile. Hostilities continued with but short intermissions until 1863, when it was determined to deport the entire tribe to the Bosque Redondo reservation on the Pecos River, near Fort Sumner, in eastern New Mexico. In the ensuing winter a mixed force of whites and Ute Indians under Kit Carson invaded the Navaho country and forced their cañon stronghold. Within a year nearly 8500 had been deported to the Bosque Redondo, and it was supposed that not more than 2000 remained at large in their own country, but later developments proved that not more than half, and these not the most troublesome, had been removed. The experiment proved a failure. The stock of the Navaho died or was stolen, their crops failed, and their numbers decreased from disease, escapes, and attacks by the Plains tribes. In June, 1868, a new treaty was made, under which the captives, then numbering 7300, were returned to a reservation set aside in their old country, and were given sheep and cattle with which to begin life anew. Since then they have remained quiet, steadily increasing in wealth and population. In 1884 the reservation was extended to its present dimensions to accommodate their rapidly increasing herds.

The Navaho have a fully developed clan system, including some 50 clans, with descent in the female line. Their government is democratic and local rather than centralized, since the nature of their country and occupation prevents the formation of large organized bodies, so that each family shifts for itself in the search for temporary pasturage and water supply. They are agricultural to a limited extent. They make some pottery and baskets, but derive their main subsistence from their herds of sheep and goats, together with horses and some cattle. They are well known for the beautiful and durable blankets which they weave from the wool of their flocks and for their artistic silver ornaments. (See colored plate of INDIAN BLANKETS with the article BLANKET.) Although they are nomadic, they build at each regular halting place permanent *hogáns*, or circular houses, of logs covered with earth, with a short covered entrance way and smoke hole at the top. Men and women alike are almost constantly at work caring for their herds, weaving, or laboring at the forge. They have elaborate and spectacular ritual ceremonies and an abundant mythology, with hundreds of sacred songs in the keeping of their priests. Aside from the industries which they have made their own they have adopted but little of the white man's civilization or teaching. They are estimated now at 22,455, less than half of whom are within the reservation limits, the rest ranging on outside pastures or working in the white settlements. Consult: Washington Matthews, *Navaho Legends* (Boston, 1897); id., *The Night Chant* (New York, 1902); The Franciscan Fathers, *An Ethnologic Dictionary of the Navaho Language* (St. Michaels, Arizona, 1910); id., *A Vocabulary of the Navaho Language* (ib., 1912); P. E. Goddard, "Indians of the Southwest," in American Museum of Natural History, *Handbook Series, No. 2* (New York, 1913). See Colored Plate of INDIANS.

NAVAHO BLANKETS. See BLANKET, with Colored Plate.

NAVAL ACADEMY, UNITED STATES. The school at which are educated the executive officers of the United States navy. It was founded as the Naval School in 1845, at Annapolis, Md., with a course fixed at five years, the first and last of which were to be spent at the school; but this plan was not strictly adhered to even at first and was subsequently changed. In 1849 the course was changed to seven years, the first two and last two being spent at the school and the three intervening years at sea, and the name of the institution

was changed to United States Naval Academy. In 1851 the four years of study were made consecutive, and annual practice cruises were commenced. In 1861 the academy was removed to Newport, R. I., on account of the war. It returned to Annapolis in 1865.

In 1873 the course for cadet midshipmen was extended to six years, the last two to be spent at sea. In 1882 the title of cadet midshipman was changed to naval cadet, which in 1902 was replaced by that of midshipman. Appointments to the different corps were made by the Secretary of the Navy upon recommendation of the academic board; but only enough appointments were made to fill vacancies, all other graduates being honorably discharged. In 1889 the law provided that the cadets of the first class (seniors) should be separated at the beginning of the year into two divisions, and those destined for the line and the engineer corps should pursue separate courses of study during the first-class year. In 1889, also, the age of candidates at date of admission, which had been from 14 to 18 years, was changed to 15 to 20 years. In 1899 the Act of March 3 consolidating the engineer corps with the line abolished the separate line and engineer divisions at the academy. The same Act increased slightly the numbers in all grades of the service and very much increased the lower grades. The supply of graduates thus became insufficient, and in 1900 the number of cadets at the academy was increased by an Act authorizing appointments to the academy every four years instead of every six. The number of officers in service subsequent to the Spanish-American War was wholly inadequate to the increasing demands of the fleet, and, as the only means of adding to the number is through the Naval Academy, an increase in the number of midshipmen was proposed. This increase, made by Congress in 1902, provided for the appointment of a midshipman every two years by each Senator, Congressman, and Delegate in Congress, and 11 by the President. By the Act of March 7, 1912, the probationary period of two years at sea was eliminated and the course fixed at four years, at the end of which, upon graduation, the midshipmen are commissioned as ensigns.

The course of study and instruction at the institution is much more advanced than the term "academy" would imply, is beyond that of most colleges, and approximates that of many postgraduate technical schools. The course for the first year (fourth class) includes mechanical drawing, algebra, geometry, descriptive geometry, trigonometry, English studies, French, Spanish, and hygiene, and practical exercises and instruction in seamanship, boats, ordnance, target practice, infantry, artillery, battery drill, fencing, gymnastics, dancing, and swimming. The course for the second year (third class) includes trigonometry, conic sections, differential and integral calculus, mechanical drawing, physics, chemistry, naval history, French and Spanish, and practical exercises and instruction in seamanship, boats, signals, ordnance, target practice, infantry, artillery, battery drill, fencing, and steam engineering. The course for the third year (second class) includes seamanship, principles of mechanism, mechanical processes, mechanical drawing, marine engines and boilers, integral calculus and mechanics, physics, chemistry, and electricity, and practical exercises and instruction in seamanship, boats, steam tactics, signals, ordnance, infantry, artillery, battery drill, target practice, fencing, and steam engineering. The course for the fourth year (first class) includes seamanship and naval tactics, gun and torpedo drills, naval ordnance and gunnery, ballistics, theoretical gun construction, navigation, theory of compass deviations, marine surveying, boilers, naval construction, engineering materials and designing, physics, electricity, and Spanish, and practical exercises and instruction in seamanship, boats, steam tactics, battery drill, target practice, torpedo practice, ordnance, artillery, infantry, fencing, compass correction, navigation, surveying, steam engineering, practical electricity, turret drill, international law, etc.

From about the first of June until the first of September the midshipmen are embarked on war vessels for the summer cruise, when they are instructed practically in the various duties of their profession. For several years since the Spanish-American War the practice vessels have been comparatively modern war vessels temporarily detached from the reserve fleet. Until 1898 most of the buildings of the academy were very old, many of them dating from the early part of the nineteenth century, and the accommodations for the midshipmen inadequate as well as unsuitable. The necessary expansion of the institution was brought to the attention of Congress by the war, and a very liberal plan of rebuilding the academy was adopted. The expenditure authorized was $10,000,000. The work is now completed, and the result is the best-equipped and handsomest naval institution of learning in the world. The headquarters of the postgraduate schools (see NAVAL SCHOOLS OF INSTRUCTION) is at the Naval Academy, though many of the courses are taken elsewhere. Consult: J. R. Soley, *History of the Naval Academy* (Washington, 1876); Park Benjamin, *The United States Naval Academy* (New York, 1900); United States Navy Department, *Courts Martial at the Naval Academy* (Washington, 1906); J. M. Conover, "West Point and Annapolis in Civil Service," in the *Nation*, vol. xcviii (New York, 1914).

NAVAL AËRONAUTICS. The various problems connected with the military use of the dirigible balloon and the aëroplane at sea are much the same as on land. In respect of construction, the dirigible is the same for both services; the aëroplane, however, must be so designed that it may alight on or rise from the water; hence the hydroaëroplane. As in the land, so in the sea service—one has to consider both offensive and reconnoitring applications of the two classes of machines.

If the offensive employment of the dirigible ashore is attended with uncertainty, still greater uncertainty waits on its use against ships. Apart from the probability of missing, increased at sea, by the condition that the target, the ship itself, is in motion, it may be remarked that light projectiles would be practically harmless against turrets and armored decks, and that the number of really destructive projectiles that may be carried is limited. At any useful height a dirigible would be seriously exposed to ship fire, delivered by guns especially designed for this sort of fire. Under this head, as under so many others of military aëronautics, experience is lacking, or, if not experience, then information in respect of achievement. If a conclusion from

negative evidence be permissible, we may take it for granted that the dirigible, in the offensive against ships, has proved a failure. It has been suggested that dirigibles could be effectively used to detect and even to attack submarines and submarine mines and mine fields, for, if the water be clear, these would all be visible from above. An instance was furnished in the War in Europe by the action of the German submarine U–9, which it was said was informed and guided by a Schütte-Lanz airship; on the other hand, this feat could just as well have been performed by an aëroplane.

In reconnaissance dirigibles could be sent out to report on the presence of a hostile fleet, upon its course if under way, and upon the nature and number of its units. Indeed, this sort of work could be more readily performed at sea than the corresponding work ashore: the dirigible becomes assimilable to a lofty observation station in communication with its own fleet or base, and enjoying, when the weather is good, an uninterrupted view in all directions.

If the weather be unfavorable, so as to obstruct the view, scouting could still pick up the hostile fleet, for it must be recollected that a naval enemy is completely revealed as soon as clearly seen, and is much more readily detected than a land enemy. In general, it is asserted that a dirigible accompanied by a mother ship carrying supplies, and equipped to generate hydrogen gas, would be of inestimable value to an admiral.

Recent as is the application of the aëroplane to the land service, still more recent is that of the hydroaëroplane to sea service. This machine has the same functions in respect of naval operations and of coast defense as the ordinary aëroplane of land operations. In a military sense, the problems that arise in its use do not differ in principle from those of the land machine; the special objective is different. Obviously, should the necessity arise, a land machine could be used in naval war, and a water machine in land war; but since a land machine cannot alight on or rise from the surface of the water, the seaplane is both logical and necessary. Accordingly we find great naval powers developing this branch of military aëronautics, other things equal, in the same ratio as that of the land service, with England, France, and Germany leading.

On the whole the reconnaissance problems that present themselves to the hydroaëroplane for solution are somewhat simpler than the corresponding ones in the land service. For example, if an invading fleet purpose an attack upon coast works, the position and nature of these can be accurately determined. If, on the other hand, the coast defense sends out the hydros to reconnoitre an attacking fleet, an accurate report can be made of the number and nature of the elements comprising the fleet. This, of course, is equally true of the reconnaissance made by two fleets operating against each other. In the two latter cases two or three hydroaëroplanes can more quickly, more accurately, and more economically perform the duty involved than a far greater number of destroyers or rapid cruisers. This is a most important consideration. A Cervera to-day would find it impossible to conceal his fleet for over 24 hours.

In purely naval work the chief duty of the hydroaëroplane is that of reconnaissance. The French naval manœuvres of 1913 in the Mediterranean established beyond all possibility of doubt the importance of this sort of craft on this duty to a naval commander.

The service is organized by the establishment of shore stations, naval centres ashore; but just as aëroplanes accompany an army in the field, so must hydroaëroplanes a fleet at sea. We may accordingly expect that warships will carry them in the future. As a matter of fact, in 1914 the U.S.S. *Mississippi* did take five hydros and flying boats to Mexico, and these were used in the American occupation of Vera Cruz. In Germany hydroaëroplanes are so constructed that they can be picked up by a crane and hoisted aboard, and then stowed until needed, when they are similarly put overboard.

On the English ship *Hibernia* a runway was constructed forward for the launching of the hydro, but this system, of course, was inconvenient unless, indeed, in future naval construction the deck shall be so designed as to be in itself a runway. This would seem to be a necessity in order to meet the case of a very rough sea, from the surface of which a seaplane could not possibly rise, although the existing military conditions might imperatively require the machine to take the air. Another method of launching a hydroaëroplane is by the catapult devised by Capt. W. I. Chambers, U.S.N. This consists essentially of a car running on a track and carrying the flying machine; the car is driven forward by the use of compressed air. It is claimed for this apparatus that it is small, may be mounted even on the top of a turret; indeed, may be used anywhere on the ship. When used, both the aëroplane and the car are projected from the track together. The car drops into the water after clearing the track, the aëroplane goes on its way in the air; the car is then hoisted aboard. To supply the needs of its air scouts a fleet may be accompanied by a mother ship or hangar ship, such as the *Foudre* of the French navy, but it will probably be found more economical and efficient to make the ship itself the unit, and so to regard hydroaëroplanes or flying boats as a part of its necessary equipment. The aëroplane will probably prove invaluable in commerce destroying both to the attack and to the defense. It is not inconceivable that commercial ships navigating waters liable to be invaded by hostile cruisers will themselves carry seaplanes, to give warning of the enemy, and so to enable the vessel to shift her course and avoid capture.

On the employment of the hydroaëroplane as an engine of destruction it is not necessary to dwell; the same limitations exist in its case as in that of the aëroplane. But if certain authorities, chief among them Sir Percy Scott, R.N., may be believed, a great future awaits the hydroaëroplane in connection with submarines. That is, if some way can be devised to assure uninterrupted communication between them, the submarine will be regularly accompanied and guided by the seaplane. This would spell revolution in naval warfare and hence in naval types. In the meantime Admiral Fiske, U.S.N., has proposed to use the aëroplane in the torpedo attack of ships; the flying machines would in this case take the place of the submarine.

The aëronautical needs of the United States navy were fully set forth in a formal report submitted in 1914 by a board appointed to consider the matter. This board recommended an equipment of 50 aëroplanes complete; 50 outfits, spare parts, etc., for fleet service, and in addition 6 aëroplanes complete, 6 outfits, 4 knockdown trucks, and 6 hangar tents, as advanced base outfit. It further recommended the purchase of one dirigible for expeditionary service with the fleet, and of a special auxiliary ship for dirigible service in connection with the subject of a special auxiliary for aëroplanes. In its opinion Pensacola afforded the best site for the Naval Aëronautical Centre. This centre should have one commandant with two divisions, aëronautic and operative, each of sufficient *personnel* and various other officials. The aëronautical laboratory should be at the Washington Navy Yard. Further, the office of Naval Aëronautics should be created at the Navy Department, in the Personnel Division, under a director and an assistant director, with representatives from the various bureaus, navigation, ordnance, etc., and from the Marine Corps. The estimated first cost of the plan was $1,297,700, surely a modest sum in comparison with the enormous expenditures of European nations. The Committee on Naval Affairs of the House recommended early in 1915 an appropriation of $1,000,000 for an aërial corps, and special pay and allowances.

As in land operations pure and simple the aëroplane, so in coast defense the hydroaëroplane, can give notice of the nature, strength, and course of an approaching antagonist. The direct effect of this is to allow ample time in which to prepare ammunition, fire trial shots, and even to move troops from points not threatened to those that are. This case presents no difference of principle from the analogous case of one army approaching another. But in coast defense many conditions arise not found in ordinary operations. Other things equal, coast defenses have little to fear from fleets in broad daylight or, more generally, when the fleet and its course can be suitably observed. Hence a fleet commander may determine to run by in a fog or behind a smoke screen. To fire upon an enemy whose position is thus unknown would be an almost criminal waste of ammunition. In such a case the service of a hydro might be invaluable, by circling over the fleet and making a signal when passing over, e.g., the flagship. A series of such signals observed ashore might enable mortar and gun salvos to be fired. In the similar case of a run by night the hydro might be equally called upon to reveal the position of the fleet.

In direct relation with this possibility the hydroaëroplane of the future may be expected to offset the radical defect of the searchlight, viz., shortness of range; it may also compensate the deficiencies of the range-finding system in this same respect. To illustrate, the modern United States army L/15 12″ mortar has, let us assume, a range of 20,000 yards, but the best searchlight will not illuminate beyond 8000; hence mortar fire, so justly dreaded by ships, at night practically ceases to exist for over one-half of its intended range of effect. Theoretically, at least, there is nothing to prevent the hydroaëroplane from taking up the work at 8000 yards and continuing it to the extreme range of the pieces interested. The hydroaëroplane will also be found useful in locating and possibly in attacking submarines and submarine mines, not merely in coast defense, but in naval operations generally; in reconnaissance against landing parties, and in correcting the howitzer and mortar fire directed against these parties.

In regard to the future it is believed by some authorities that if a seaworthy craft is to be had the seaplane must be both large and powerful. In other words, what is contemplated is a true flying boat, of great horse power, having sleeping accommodations, and carrying food and water. Hence the biplane is to be preferred to the monoplane. The seaplane must also be able to withstand a heavy sea. In a German test the machines were required to rise from and land on the sea, when the waves were breaking one meter high, crest to trough, and to float on such a sea for one hour, with the engines stopped, and without damage to any part from leakage. Specifications for the United States navy call for the construction of armored hydroaëroplanes to carry rapid-fire gun and ammunition and two passengers. These machines must have a maximum speed of at least 80 miles an hour, a radius of action at full speed of four hours, adequate climbing power, and be able to glide at an angle of 1 on 6. They must further be able to rise from the water and alight in the open sea under ordinary conditions, to ride at anchor or drift without danger of capsizing, and to fly safely in a 35-mile breeze. For bibliography and illustrations, see under AËRONAUTICS and MILITARY AËRONAUTICS, which can be read with advantage in this connection, but the fact should be emphasized that conditions have changed and are changing so rapidly that the latest information and developments, as well as conclusions derived from experience in the recent European War, can be obtained not from treatises but from the current files of such journals as *The Scientific American* (New York); the magazine *Flying* (New York); *The Journal of the United States Naval Institute* (Annapolis); *The United Service Magazine* (London); various European naval annuals and reports of the United States Navy Department.

NAVAL APPRENTICE. Naval apprentices in the service of the United States, such as are described under the head of APPRENTICE, are no longer enlisted. The title is now *apprentice seaman*, and the method of instruction is radically different. The applicant for enlistment must be 17 years old, of robust frame, intelligent, of perfectly sound and healthy constitution, free from all physical defects or malformations, and not subject to fits. He must also be able to read and write. The instruction at the training stations (Newport, Norfolk, San Francisco, and Lake Michigan) lasts about six months and includes the rudiments of training only. Apprentice seamen are taught the elements of naval discipline and how to take care of their person and their clothes. They are given instruction in rowing, knotting, and splicing, and in English studies; also a little knowledge of gunnery. When the course at the training station is completed, they are rated *ordinary seamen* and transferred to the regular ships of the service. Their instruction is there continued. See NAVAL SCHOOLS OF INSTRUCTION.

NAVAL ARCHITECTS AND MARINE ENGINEERS, THE SOCIETY OF. An association incorporated under the laws of New York State,

with headquarters in New York City. The object of the association is the promotion of the art of shipbuilding. It has a membership of about 900. The society holds annual meetings, and publishes *Proceedings*.

NAVAL ARCHITECTURE. See SHIPBUILDING.

NAVAL CADET. See MIDSHIPMAN.

NAVAL CHEST. See CHEST, NAVAL.

NAVAL CLERK. See CLERK, PAYMASTER'S.

NAVAL COLLEGE, ROYAL. See ROYAL NAVAL COLLEGE.

NAVAL COLLEGE OF CANADA. A school for training naval cadets at Halifax. The course of study is three years, and the age at date of admission is from 14 to 16 years. At present the Department of the Naval Service does not in any way bind itself to issue commissions to graduates of the Royal Naval College nor, on the other hand, does it require cadets to adopt a naval career. Arrangements have, however, been made with the British Admiralty by which they have agreed to accept each year eight cadets who have completed their course at the college, provided these cadets have attained the required standard of efficiency. They will be entered in the Royal Navy as cadets of the same standing as graduates of the Dartmouth Naval College. Arrangements have also been completed with the McGill University and the University of Toronto, by which they will admit graduates of the college to the second year of the course of applied science in these universities. The entry is made through competitive examinations, the number of candidates selected being dependent upon the number of vacancies. Candidates must be British subjects and must have resided, or their parents must have resided, in Canada for two years immediately preceding the examination. A short period of absence abroad for the purposes of education may be considered as residence in Canada.

The entrance examinations take place in May at the examination centres of the Civil Service Commission. Blank application forms for admission and information concerning dates and plans of examination are furnished by the office of the Civil Service Commission, Ottawa. Candidates are examined in arithmetic, algebra, geometry, geography, history, writing and dictation, and either French or German; for the purpose of adding to their marks they may take two of four optional subjects—Latin, elementary science, drawing, or a second modern language. The fee for the examination is $4. The candidate must be physically sound and will be examined to determine this. Cadets receive no pay while in the college. Each cadet is required to pay annually in advance a fee of $100. In addition, he must pay a fee of $350 for the first year and $225 for each of the succeeding years. The college provides, free of expense, the necessary furniture, bedding, mess equipment, and table board. The training at the college extends over a period of three years, with vacations of six weeks at Christmas and six weeks in summer. The course of study at the college includes: mathematics, navigation, mechanics, physics, chemistry, engineering, seamanship, pilotage, French or German, English, geography, and history (including naval history).

NAVAL CONSTRUCTORS. Officers of the United States navy charged with the design, building, and repair of ships. The corps of naval constructors is filled by appointment of graduates of the Naval Academy who are sent (after graduation) to the naval postgraduate school, or to special technical schools, for an additional course in shipbuilding and naval architecture. The general features of new types of ships are prescribed by the Secretary of the Navy upon recommendation of the General Board and Chief of Operations. The design and details are worked out by the chief constructor and his assistants in the Bureau of Construction and Repair of the Navy Department in consultation with the chiefs of bureaus of Steam Engineering and Ordnance. The building of the hulls of all naval vessels in private shipyards is supervised by naval constructors detailed to that duty, and they are in charge of hull construction and repair when the work is carried on in navy yards. In 1915 there were 5 naval constructors of the rank of captain, 5 of the rank of commander, 23 of the rank of lieutenant commander, and 18 of the rank of lieutenant; the assistant constructors are 24 in number, 14 with the rank of lieutenant and 10 with the rank of lieutenant, junior grade.

NAVAL CROWN. In heraldry, a rim of gold around which are placed alternately prows of galleys and square sails, conferred on one who performed some valiant act on the seas.

NAVAL ENGINEER. See ENGINEER, NAVAL.

NAVAL FUEL SHIP. See FUEL SHIP, NAVAL.

NAVAL GUNS. See GUNS, NAVAL.

NAVAL INSTITUTE, UNITED STATES. An organization founded at Annapolis in 1873 by the officers then on duty at the United States Naval Academy. It has for its object the promulgation of knowledge concerning naval affairs among the officers of the naval service. During the first years of its existence it issued occasional numbers of its *Proceedings*, but in a short time the publication was made quarterly, and this was continued until 1914, when it was changed to bimonthly. The publication is one of the largest and most important periodicals of its type in the world, and the character of its articles, which cover the whole range of naval affairs, is unsurpassed. Its bimonthly review of foreign naval activities is the most extensive and most conveniently arranged compilation given in any publication. Each year the institute offers a gold medal, a life membership, and a prize of $200 for the best essay on any subject of interest to the naval service, reserving the right to withhold the offer if no worthy essay is presented. The institute also publishes a large number of books on naval, technical, and allied subjects.

All officers of the navy and persons holding positions under the Navy Department are eligible to membership, and other persons interested in naval affairs may be elected as associate or honorary members. The present membership of the institute includes about half of all the officers in the navy and is steadily increasing.

NAVAL LAW. See MILITARY LAW.

NAVAL LIEUTENANT. See LIEUTENANT.

NAVAL MACHINIST. See MACHINIST, NAVAL.

NAVAL MILITIA. See NAVAL RESERVE.

NAVAL OBSERVATORY, UNITED STATES. A government institution, situated at Washington, D. C., in lat. 38° 55′ 14″ N. and long. 5^h 8^m 15.78^s W., a division of the Bureau of Navi-

gation in the Navy Department. Its functions are to determine the positions of the sun, moon, planets, and stars for use in preparing the *American Ephemeris and Nautical Almanac;* to issue correct standard time by telegraph and radio at noon and at 10 P.M. daily, 75th meridian, for use of navigators and all others requiring accurate time; to test, purchase, distribute, and repair instruments of precision, including chronometers and gyrocompasses, used by the navy in navigation, surveying, and aëronautics; to conduct astronomical investigations of general and special scientific interest; and, since 1894, to publish the *American Ephemeris and Nautical Almanac.* It had its origin in a depot of charts and instruments established by the Navy Department under the charge of Lieut. L. M. Goldsborough, U.S.N., in 1830. In 1833 Lieutenant Wilkes, U.S.N., moved the depot to a site on Capitol Hill, and at his own expense built an observatory containing a transit instrument of 3¾-inch aperture, a Borda's circle, a 3½-foot achromatic portable telescope, a portable transit instrument, and a sidereal clock. In the summer of 1838 the Secretary of the Navy directed the superintendent "to make a constant series of observations in astronomy, magnetism, and meteorology, ordering an additional number of assistants (naval officers), and granting authority for the purchase of all necessary instruments." Under these instructions Lieut. J. M. Gilliss, U.S.N., began systematic observations in astronomy with additional instruments as follows: a sidereal clock and a mean-time clock; a meridian circle of 4½-inch aperture; a portable achromatic telescope of 3¼-inch aperture. The work done under his direction at the Capitol Hill depot between 1838 and 1842 was published in 1846 as *Astronomical Observations Made at the Naval Observatory,* being the first American volume of this nature.

A building for this depot was authorized by Congress in 1842 through the efforts of Lieutenant Gilliss, who, after consulting American and European scientists, prepared plans and erected the Naval Observatory. Soon after the instruments were in place Lieut. M. F. Maury, U.S.N., succeeded to the charge of the observatory, and in addition to astronomical work devoted much of his personal attention to the study of ocean currents and other hydrographic and nautical subjects. Among the earliest of the scientific achievements of the new observatory were the observations of Neptune secured in 1846 immediately after the discovery of that planet, which enabled Sears C. Walker, by identifying two older foreign observations, to determine the elements of the orbit of Neptune. The application by Prof. John Locke of electricity in recording observations resulted in the installation of the first practical chronograph at the observatory in 1849. With the 9.6-inch equatorial Assistant Astronomer James Ferguson discovered several asteroids between 1854 and 1860. The 26-inch lens made by Alvan Clark, at the time the largest refracting telescope in the world, enabled Prof. Asaph Hall to discover the satellites of Mars in 1877. The observatory was removed to Georgetown Heights in 1893, where the necessary buildings for offices, clockhouse, and vault, together with the houses for the following instruments, were erected: the 26-inch equatorial, the 12-inch equatorial, the 10-inch photo-equatorial, the 9-inch transit circle, the 6-inch transit circle, the 5-inch prime vertical, the 5-inch alt-azimuth, the 5-inch transit, the 40-foot photoheliograph of 5-inch aperture, and numerous others. In addition to its routine work, the observatory has, since 1893, participated in such large works of international coöperation as the observation of a zone of stars for the *Katalog der astronomischen Gesellschaft,* the observation of the asteroid Eros and photographic reference stars for the determination of the solar parallax, the observation of an extensive catalogue of zodiacal stars, and the observation of the fundamental and intermediary stars for the Photographic Chart of the Heavens. There have also been made extensive series of observations of the satellites of the planets, of asteroids and of comets with determinations of their orbits, and a series of observations extending over 20 years for the determination of the constant of nutation. In the winter of 1913–14 separate parties from the observatory and from France, in cooperation, made independently the first direct determinations of the difference of longitude between Washington and Europe, by the interchange of radio signals from the naval radio station at Arlington and the Eiffel Tower radio station at Paris. The library contains about 28,000 volumes and is the most complete astronomical collection in the country. The publications of the observatory comprise more than 50 large quarto volumes, which contain full details of the work done, with many valuable scientific memoirs by Hall, Newcomb, and others.

NAVAL ORDER OF THE UNITED STATES. An hereditary patriotic society organized in Boston, Mass., on Nov. 10, 1890, having for its objects the perpetuation of the deeds of the American navy through the encouragement of research in naval arts and science and the preservation of historic memorials relating to the navy of the United States. It includes a Grand Commandery and six State commanderies. There are two classes of companions. The first class includes veteran officers and their male descendants; and the second class, enlisted men who have received the United States naval medal for bravery in the face of the enemy. The badge of the order is a gold Maltese cross coated with blue enamel and edged with gold. In the centre of the obverse is the insignia of the navy of the United States with the motto "Fidelitas et Patria"; on the reverse is the insignia of the Marine Corps. There are State commanderies in Massachusetts, Pennsylvania, New York, California, Illinois, and the District of Columbia. Representatives from these commanderies meet triennially as a general commandery. The total membership is about 500.

NAVAL RESERVE. In all the more important navies, in addition to the regular forces serving continuously with the fleet, there are certain others which are drilled and instructed in order to be able to supplement the *personnel* of the fleet in time of war. In peace these men are largely employed in the merchant marine, in yachts, in auxiliary government services, or are pensioners or have served the requisite length of time for pension or discharge, but are still within the limit of age. In some countries a portion of the naval reserves have not served either in the mercantile marine or the navy, but receive a certain amount of training for such service; while in countries in which

service in the army and navy is compulsory the greater part of the reserve is made up of men who have completed the requisite length of active service with the fleet.

The naval reserve of the United States was established by Act of Congress approved March 3, 1915. It consists of citizens of the United States who have served in the navy for four years or more or an enlistment during their minority. It is organized under the Bureau of Navigation of the Navy Department and is governed by the Articles for the Government of the Navy, and by the Navy Regulations and Instructions. Whenever actively employed with the navy its members, while so employed, are considered to be in all respects in the same status as enlisted men of the navy on active duty, except that they are not to be advanced in rating during times of peace. When not actively employed they are not entitled to pay or emoluments of any kind except the pay expressly provided for members of the naval reserve. Service in the naval reserve does not count for retirement.

Enlistments in the naval reserve are made for four years (unless sooner discharged), and must be made within eight years of final discharge from the navy. Enlistments are in two classes. Class one includes those enlisting in the reserve within four months of discharge from the navy. Class two includes all others. Men may also be transferred to the naval reserve at the expiration of enlistment in the rate in which serving, provided they have served 16 years in the navy. Members of class one and men transferred at expiration of enlistment are required to keep on hand such parts of their uniform as may be prescribed by the Secretary of the Navy, and all members of the naval reserve are issued a distinctive badge which may be worn with civilian dress. Members of class one who have served less than 8 years in the navy are paid at the rate of $30 per annum; 8 to 12 years, $60 per annum; 12 years or more, $100 per annum. All members of class two receive $12 per annum, and when first called into service receive a clothing allowance of $30. Members of the naval reserve who are transferred to the reserve, after 16 years or more of active service, will be paid at the rate of one-third or of one-half their base pay, according to whether they have served 16 to 20 years or over 20 years, plus permanent additions thereto which they were receiving at the close of their last service in the navy. Members of the naval reserve may, in time of peace, be required to perform not less than one month's active service on board a vessel of the navy during each year of service in the naval reserve, and such active service shall not exceed two months in any one year. In time of war they may be required to serve throughout the war or their term of enlistment.

Members of class one and those who have been transferred to the reserve who reënlist in the navy within four months from the date of their discharge from the naval reserve will not receive gratuity pay for reënlistment, but their enlistment for purposes of determining pay will be held to have occurred within four months of discharge from the navy. The period of active service while in the reserve counts towards the time required to secure retirement for those who reënlist in the navy after service in the reserve.

Any enlisted man on the retired list may, in time of war or threatened war, be called upon for such duty as he may be able to perform; while so serving he will receive the same pay and allowances as he had when retired. Enlisted men on the retired list are not eligible for enlistment in or transfer to the naval reserve.

Naval Militia. The naval militia of the United States is supplemental to the naval reserve. It is organized in the District of Columbia and in 22 States, viz., California, Connecticut, Florida, Illinois, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Washington, and Wisconsin. The total number of officers and men on Jan. 1, 1915, was 7785, divided as follows: commissioned officers, 589; warrant officers, 29; petty officers, 1573; men, 5594. Members of the naval militia receive no pay and are not required to serve on board ships in active service, but facilities for such service are granted every year. One or more vessels (mostly of small size) have been lent to the different States for the use of their naval militia for purposes of drill and exercise. Many of these are fully manned and equipped and take short cruises each year. All matters pertaining to the naval militia are under the cognizance of the Assistant Secretary of the Navy, who transacts all business concerning them with the various State authorities. A naval officer (usually a commander) has charge of naval-militia matters under the direction of the Assistant Secretary.

Reserve Ships. The ships in reserve are the older types of battleships, armored cruisers, cruisers, and many auxiliaries. The battleships and armored cruisers are commanded and manned by officers and men of the active navy, but only about one-third of the complement is kept on board. The cruisers are either out of commission or in use by the naval militia.

British Naval Reserve. The British naval reserve consists of (*a*) Royal Fleet Reserve, (*b*) Royal Naval Volunteer Reserve, (*c*) Pensioners (long-service men), (*d*) Royal Naval Reserve, (*e*) Coast Guard. The period of enlistment is 10 years, the first part of which is spent with the fleet and the last part in the fleet reserve. At the beginning of the War in 1914 the numbers in the reserve were:

(*a*) Royal Fleet Reserve:	
Immediate reserve	4,070
Class A — pensioners	8,327
Class B — nonpensioners	18,710
Class C — " (artificer ratings)	30
	31,137
(*b*) Royal Naval Volunteer Reserve (officers and men)	4,500
(*c*) Pensioners (long-service men)	8,110
(*d*) Royal Naval Reserve (officers and men)	20,348
	64,095
(*e*) Coast Guard (officers and men)	3,015
Total	67,110

The Royal Naval Reserve was created in 1860 and consists of officers and men employed in the merchant service but trained in the navy. For this purpose they are mustered annually on the drill ships in the different ports. They also serve (practically all the officers) on board the regular vessels of the navy, and when so serving are on the same footing as officers and men of the regular service. In times of peace they are largely called out in the annual manœuvres.

German Naval Reserve. Service in the German navy is compulsory upon the seafaring and semiseafaring population and lasts in theory for seven years. Three years of this are spent in active service with the fleet and four years in the fleet reserve when the annual manœuvres or requirements of the fleet do not call for their services. Each reservist is required to take part in two training courses, not to exceed eight weeks each, during the four years. He then passes into the Seewehr—in its first class for five years and then into its second class, where he remains until he reaches the age of 39 years. There is also an Ersatz Reserve, which serves, on mobilization, for completing the complements of the navy. It is composed of men who have not served in the navy because they were in excess of the number required, or were exempted for domestic reasons, or did not fully satisfy the physical requirements. They are subject to call to attend the training courses before their thirty-second year, but these courses have not been held for a long time, as their services were not needed. At the beginning of the European War which broke out in 1914 the effective reserve consisted of about 90,000 men.

The French, Russian, Italian, and Austrian naval reserves are formed in a manner similar to that of Germany. At the beginning of the War of 1914 the French reserve consisted of about 60,000 effectives, that of Italy of about 30,000, and that of Austria of 15,000. Russian naval reserve probably exists only on paper. It has never been adequate, even to man the fleet for manœuvres. See NAVIES.

NAVAL SCHOOLS OF INSTRUCTION. In the United States naval schools for officers consist of the Naval Academy (q.v.), the Naval War College, and postgraduate schools in ordnance, marine engineering, electrical engineering, aviation, medicine, and the marine school of application. The Naval War College was established at Newport, R. I., in 1881. It performs the double function of instruction and of preparing plans of operations in conjunction with the General Board, the Office of Naval Intelligence, and the Chief of Operations. The president is a naval officer of high rank (captain or rear admiral), and there is a permanent staff of four to eight officers as assistants. Lectures are also given by distinguished authorities on international law, history, and other subjects connected with naval affairs. Officers are ordered for instruction in the long course (about nine months) or the short course (three or four months). Others go there for the study of special professional subjects. The instruction consists in lectures on professional subjects, the study of naval war, and practical exercises in tactics and strategy on the war-game board. The postgraduate schools are for young officers who specialize in shipbuilding and naval architecture, ordnance, marine engineering, electrical engineering, and aviation. These are not schools in the sense of organizations, but more properly courses of study and instruction. The officers studying shipbuilding and naval architecture pursue their studies at the Boston Institute of Technology at present. They were formerly educated abroad. The ordnance school consists of instruction at the gun factory, torpedo station, powder factory, proving ground, and at Washington University, covering all branches of ordnance and allied subjects. The marine engineering school consists in work at the engineering experimental station and postgraduate school at Annapolis and in courses in marine engineering at various universities. The course in electrical engineering is taken at certain universities and includes radio (wireless) work. The aviation school has been divided between Annapolis and Pensacola. All officers pursuing postgraduate courses may be required to take part of their courses at the postgraduate school at Annapolis, Md. The naval medical school (see MEDICAL DEPARTMENT OF THE UNITED STATES NAVY) is at Washington. It gives young surgeons a course in naval medicine and hygiene. The marine school of application is at Annapolis, Md.

The schools for enlisted men are training schools, seaman gunners' school, electrical school, yeoman school, machinist mates' school, artificers' school, musicians' school, and the school for commissary stewards, cooks, and bakers. The training schools are at the training stations in Newport, Norfolk, North Chicago, and San Francisco (Yerba Buena Island). Recruits, upon first enlistment, are sent to those schools for six months' instruction before going aboard ship. (See NAVAL APPRENTICE.) The seaman gunners' school gives instruction (to men who have served one enlistment) in ordnance and machine work (Washington gun factory) and torpedoes (Newport torpedo station). The electrical schools are at the New York and Mare Island navy yards. Instruction is given in all kinds of electrical work, including radiotelegraphy. The machinists' mates' school, which trains men in all kinds of machine work and in the operation of boilers and machinery, is located at the Charlestown Navy Yard. The yeoman schools are at New York Navy Yard and at the Yerba Buena training station, and train men for naval clerical duties, including typewriting and stenography. The schools for artificers (carpenter, shipwright, plumber, coppersmith, blacksmith, etc.) are at the Charlestown and Norfolk yards. The musicians' schools are at the Newport and Norfolk training stations. The schools for commissary stewards, cooks, and bakers are at the Newport and Yerba Buena training stations. At all training stations and on board all ships in commission the enlisted men are given instruction in English studies, mathematics, and the theoretical and practical parts of their work, the amount of instruction above a fixed minimum being based upon the man's aptitude and desire to acquire knowledge.

In several States there are public marine schools which are maintained by the States, but the training ships and officers are furnished by the Navy Department. These schools are for the education of young officers for the merchant marine.

Argentina. The naval school of Argentina is at Buenos Aires. The age at date of admission is 14 to 17 years, and the course is four years. This includes cruises on the training ship *Sarmiento*. The torpedo school is on the old cruiser *Maipú*. See NAVIES, *Argentina*.

Austria-Hungary. The greater part of the executive officers of the Austro-Hungarian navy are graduates of the naval academy at Fiume; the others are appointed provisionally, and serve in the fleet until able to pass a satisfactory examination. The age at date of admission to the academy is 14 to 16 years. The course is four years, three months of every year being

spent on board a practice ship. There are also a gunnery school, torpedo school, mining and telegraph school, and a training school for boys and recruits. These schools are either on board vessels or have vessels attached to them. The training school is on board an old line-of-battle ship and has sailing and steam practice ships as tenders.

Brazil. The executive officers of the Brazilian navy are drawn from the graduates of the naval academy on the island of Enxadas in the harbor of Rio de Janeiro. The limits of age at entrance are 13 and 17 years. The graduates are transferred to the naval college (also at Rio de Janeiro) for an additional course of four years.

Chile. The Chilean naval academy is at Valparaiso. The course is six years, previous to which the cadet must have completed three years at the military academy at Santiago. The course includes cruises on a training ship. The engineering school is at Talcahuano. Chile also has a naval war college, somewhat similar in character to that of the United States. It is reported that the course of instruction for Chilean officers is to be radically changed. Early in 1915 the Chilean government requested the detail of two officers of the United States navy, presumably to assist in this work.

China. Though China had practically no navy in 1915, the government was preparing for its enlargement by reopening its naval schools at Chifu, Nanking, Foochow, Canton, and Wusung. The most important of these is the one at Chifu, which has a director, 16 instructors, and 192 pupils. The budget for 1914 provided for the use of three vessels (1900 to 2200 tons) as school ships. See NAVIES, *China*.

Denmark. The Danish naval school for executive officers is at Copenhagen. There are 10 admissions each year, the candidates for which must be from 15 to 20 years of age and have served 9 months in the navy or 18 months in the merchant marine. After a preliminary cruise of three months they are reëxamined; 6 of the 10 are selected and the others discharged. The course of instruction is four years. See NAVIES, *Denmark*.

France. The French naval school for the training of officers is at Brest. It was established by Napoleon in 1810 and comprised two sections—one at Brest, the other at Toulon. Both were on board vessels—the *Tourville* at Brest, the *Duquesne* at Toulon. After several changes the school was, in 1830, installed on a vessel anchored in the roadstead of Brest. Various ships have been assigned to this duty, but since 1841 they have borne or have been given the name of *Borda*. In 1911 the present buildings were commenced, and in 1914 the school was moved on shore to its new quarters. The requirements at entrance are high and approximate those of the Ecole Polytechnique. The age at entrance is from 14 to 18 years, and the course is two years. After completing the course at the naval school the cadets are promoted to the grade of *aspirant* (midshipman) second class, and sent on board a cruising training ship for one year for further instruction, especially in practical work. They are then promoted to *aspirants* first class, and their training ceases. The school for engineers is one of engine design and construction. Special courses are taken at the Ecole Polytechnique. The medical schools are three in number and are located at Brest, Rochefort, and Toulon. The course of study is two years. There are also the superior training school for officers of the executive branch, and torpedo, gunnery, navigation, and ordnance schools for the practical training of officers who incline to become specialists. Following the lead of the United States and British navies there is a certain unification of the instruction for executive and engineering officers and a tendency towards consolidation, as in the United States service. The school for apprentices of the enlisted force is on board three or more training ships. The schools for machinists, artificers, and stokers are also on board old vessels in the harbors of Toulon and Brest.

Germany. The German naval academy in 1913–14 was transferred to its new quarters at Mürwik, near Flensburg. The enrollment of cadets takes place in April of each year. Candidates are ordinarily from 17 to 20 years of age. Those with "maturity" certificates from a royal high school (Realgymnasium) have certain advantages, and may receive commissions a year earlier than the men who pass less rigid examinations. After about five weeks' preliminary instruction cadets are sent on board practice ships (old cruisers of the *Hertha* class, 5600 tons) for the remainder of the year, during which the vessels cruise in home waters and abroad. At the end of the year they are examined and, if qualified, are promoted to the grade of midshipman (*Fähnrich zur See*). The next year is spent in theoretical work in the professional sciences. After passing an examination concerning this work they spend six months in courses at the gunnery school, on the torpedo training ship, and with the marine infantry, each course ending with an examination. They are then sent on board ships of the regular service for one year's practical training. At the end of this year those who obtain favorable certificates are promoted to the grade of ensign (*Leutenant zur See*), but remain another year on board, though their education is supposed to be completed when they are promoted. Candidates for naval engineers must be not over 21 years of age, of good character, have means sufficient to eke out the service pay during four years ($10 per month, decreasing to $5 at the end), and have two years' practical experience at machine works. They enter with enlisted men's ratings, but are kept separate from all others of their branch and wear a special uniform. On enrollment (in the autumn) they receive three months' training in military matters, then nine months' practical instruction on vessels of the high-sea fleet. After passing an examination they are promoted to petty officers. Then follow two years of practical experience in petty officers' duties on ships or torpedo vessels and one year's attendance at the engineers' school (one at Kiel, one at Wilhelmshaven). This is intended to provide the necessary theoretical groundwork for understanding what has been learned in practice. The rank of warrant officer is now obtained. Four years' experience in this rank is followed by a second school year, ending in promotion to the rank of commissioned engineer. Of the enlisted force of the German navy 73 per cent are derived from ship's boys. These are enlisted between the ages of 15 and 18 years. They serve two years as boys, three years in fulfillment of their service liability, and four years in return for the training they

have received. They are enrolled in October, are instructed on a stationary training ship at Mürwik for six months, then have one year in a cruising training ship, and complete their instruction by six months on a stationary ship. They are then sworn in as seamen, being allotted, as far as possible, to the branch of the service they prefer—seaman, torpedo, mining, or submarine. The engine and fire room ratings are derived from the seafaring population possessing the required qualifications.

Great Britain. The British naval school for the instruction of officers is divided into two parts. One is at Osborne on the Isle of Wight and the other at Dartmouth. The age at entrance is from 13½ to 14½ years (though this has been frequently changed). The first two years of the course are given at Osborne, the last two years at Dartmouth. Then come eight months in a cruiser; after this, two years and four months' service as a midshipman, followed by promotion to sublieutenant. After promotion to lieutenant all officers must specialize as lieutenants of engineering, gunnery, torpedoes, navigation, instruction, or marines, or remain as general-service officers. Officers specializing in engineering go to Keyham for one year and to Greenwich naval college for six months. Nearly all who finish this course go to sea as engineers, but a few are selected for an advanced course of two years, and will eventually qualify as designing engineers. Junior engineers are given sufficient executive duty to render them familiar with it. Upon promotion all lieutenants become commanders in the general list of the executive branch, except engineer officers, navigating officers, and marine officers, who are commissioned in their own branch; but these revert to the general list on reaching the grade of captain, except the designing engineers and the greater part of the marine officers. The naval college at Greenwich is a postgraduate school in all the naval sciences and branches. The course varies, but the full term is usually two years. The naval war college (very similar in character to that of the United States) is located at Portsmouth, but it was reported that it would be moved to Greenwich. There were several aviation schools in 1915, owing to war conditions. There are also torpedo schools and gunnery schools located on board ship. The headquarters of the gunnery school is on the gunboat *Excellent* at Portsmouth. The torpedo schools are at Portsmouth and Devonport. These schools also instruct enlisted men. The other schools for the enlisted force include training ships for boys, for boy artificers, and for mechanicians; also a cooking-school ship. The drill ships for the Royal Naval Reserve and for the Royal Naval Volunteer Reserve are large vessels of old type located at ports convenient for the purpose. Canada and Australia have established naval forces and naval academies and training schools. The Canadian academy (see NAVAL COLLEGE OF CANADA) is at Halifax, and the Australian is at Sydney.

Italy. The Italian naval academy is located at Leghorn (Livorno). The instruction is in two parts: (*a*) the normal course and (*b*) the superior course. These courses have recently been considerably changed and the age of admission lowered. It is now 12 to 15 years. The normal course is five years in length, eight months of each year being spent at the academy and three months on practice ships. At the end of the course all cadets who pass the required examinations are appointed midshipmen and sent to sea for at least a year. They are then commissioned as sublieutenants and sent to the academy for the superior course, which comprises two sessions. The first is obligatory for all sublieutenants; the examination at the end of it fixes the rank of the officers in their grade and affects greatly the question of their advancement (one-third are promoted by selection and two-thirds by seniority). To the second session are admitted only those who have attained a certain standard in their examinations, and these more fortunate young men receive a diploma which has an important influence upon their naval career and eventual promotion. The naval constructors, constructing engineers, and commissary officers are also graduates of the academy. The schools for the enlisted men are five in number. There are also training ships for seamen. The question of training officers and men has recently been extensively considered, and it was proposed to follow the British system more closely, particularly in regard to the education and status of engineer officers.

Netherlands. The naval school for the Netherlands navy is located at Willemsoord. The age of entrance is 14 to 17 years, and the course is four years. At the end of the course the cadets who pass the required examinations are appointed as cadets of the first class. After two years in ships of the regular service they are again examined and, if found qualified, are commissioned as second lieutenants. The special engineer school is at Hellevetsluis. There are also torpedo and gunnery school ships and training ships for instructing the enlisted force; also drill ships for the naval militia.

Norway. The Norwegian naval school furnishes not only the officers of the regular service, but also those of the reserve. Candidates for admission to the school must not be over 19 years of age and must have served for 21 months in the merchant marine. The course at the school is in two parts, inferior and superior. The inferior course is three years long, and at the end cadets become ensigns. Those ensigns who are not destined to form part of the regular navy are, after two years of ordinary service, made lieutenants of the reserve. The superior course has two terms of eight months each. After 18 months of additional service the graduates of the superior school are promoted to the rank of lieutenant. There are also gunnery and torpedo schools and training ships for the enlisted force.

Portugal. The naval school of Portugal is a polytechnic institution. The course for officers of the executive branch consists of three months on a training vessel, one year at the naval school, three months on a training vessel again, and lastly another year at the school. The graduates are then appointed midshipmen, and after two years of service are commissioned as ensigns. There are gunnery and torpedo schools for both officers and men and training-school ships for boys.

Rumania. Early in 1914 the Rumanian government decided to establish a naval academy at Kustendje. Eighteen officers, selected for instructors, were sent abroad for special study. See NAVIES, *Rumania*.

Russia. The training of officers in the Russian navy was being changed, and the details had not been fully settled at the time of the

Great War of 1914. The principal source of supply of officers was the Imperial naval academy at Petrograd (St. Petersburg). The course was four years, at the conclusion of which the cadets became midshipmen. The academy had postgraduate courses in strategy, tactics, international law, etc. In 1915 a new academy was under construction at Sebastopol at a cost, including equipment, of $4,000,000. When it is completed the primary course of instruction will be transferred to the new institution, which will have quarters for 500 cadets. The old school will be retained as a naval college with postgraduate and advanced courses only, and will also house the naval war college. At Kronstadt there is a school of navigation and ordnance with a primary course of four years similar to that at Petrograd. Whether this institution is to be retained after the completion of the academy at Sebastopol was not stated, but it is presumed that it will be continued as a station for practical instruction in navigation, ordnance, torpedo, etc. There are also training schools (chiefly on shipboard) for engineers, machinists, gunners, torpedo men, seamen, etc.

Spain. The officers of the executive branch of the Spanish navy are graduates of the royal naval school. The age at entrance is from 13 to 18 years. The course is three years, at the end of which the cadets become midshipmen. They then serve one year on a ship detailed as the school of application, one year on the sailing vessel *Nautilus*, and one year on vessels in regular service. After passing an examination they are then commissioned as sublieutenants. There are also floating gunnery and torpedo schools and vessels for the training of seamen and boys.

Sweden. The Swedish naval academy for the training of officers of the executive branch is at Stockholm. The age at entrance is 13 to 16 years. The course is six years, eight months of each year at the academy and four months on a practice ship. Upon graduation the cadets are made sublieutenants. They are then sent for six months as instructors in a school (*Exercisskolan*) where the enlisted men receive their naval instruction. This is followed by six months' service of various kinds, including some time spent at the dockyard. They are then assigned terms of duty with the mobile defense of the coast and at the gunnery school, and after eight or nine months in cruising ships they are commissioned as ensigns. There are also a school of the mobile defense, a school for enlisted men (*Exercisskolan*, already mentioned), a torpedo school, and a gunnery school.

Turkey. The Turkish naval school was broken up by the Great War of 1914. The course was supposed to last 10 years, but the instruction was very irregular. See NAVIES; MIDSHIPMAN; NAVAL APPRENTICE (recently renamed apprentice seaman).

NAVAL SIGNALS. See SIGNALS, MARINE.

NAVAL STATION. A government establishment usually to provide coal, fuel oil, supplies or other equipment for ships of war: Naval stations vary in size and nature with their location and object. They may even form a base for a fleet and include a dry dock, shops, and various ordnance supplies. On the other hand, naval stations may be arranged for a single purpose, as for example, a base for submarines, training quarters for seamen, a marine garrison, a guard for a cable landing, etc., and often are located in distant places or colonial possessions. In some cases they may be acquired by lease or treaty from the friendly power or secured from an inferior nation or from a conquered foe.

NAVAL STORES. The origin of this term, which commercially is applied to the great turpentine and rosin industry of the southern United States, is uncertain, but it is probably derived from the fact that these and other materials broadly included in this designation were at one time chiefly used by shipping. The list of articles so classed is ill defined. They are all of vegetable origin and include turpentine, rosin, tar, pitch, linseed oil, oakum, and certain varnishes and gums. Though still largely used on shipboard nearly all these substances now have a much wider application in manufacturing and the liberal arts. Many of them have medicinal value, such as tar, turpentine, linseed oil, and gum thus, or ordinary frankincense. The last named, commonly called scrape, is the crude gum which collects on the turpentine pine tree when an incision is made in its bark. It is used by druggists as an ingredient in certain ointments and other pharmacal preparations.

Wood Tar (see TAR) is still used for preserving hemp rope, which is impregnated with it. A mixture of tar and pitch or tar and rosin was used as a protective coating for the bottoms of wooden ships before the practice of coppering wooden vessels became practically universal.

Pitch is of various kinds, differing somewhat in composition, and is derived in several ways. The name is applied to a gluelike substance consisting of resinous hydrocarbons such as asphaltum, rosin, tar, etc. The pitch used in wooden ships was usually that derived from wood tar by the removal of the volatile products. It was also prepared by heating and mixing wood tar and rosin. It has to some extent been replaced by substances of a similar character called naval glue, seam cement, and other patented mixtures. It is used on board ship to fill the seams of wooden decks after they have been calked with oakum. For this purpose it is melted and poured into the seams. After it cools and hardens the surplus pitch is scraped off, leaving the seam level with the deck. The operation is called paying the seam. The seams in the sides and bottoms of wooden ships are similarly treated, though a sort of putty was and is used to a considerable extent, especially on the sides and decks of wooden yachts and on the decks of steel ones.

The other substances mentioned are described in separate articles under their own names—tar, rosin, etc. Many of the materials included under the head of naval stores have been replaced in part by petroleum and coal-tar products. While these substitutes are, as a rule, inferior to the articles they replace, they are cheaper and suffice for many purposes. The standards for naval stores as used by the United States government are prescribed by the Bureau of Chemistry of the Department of Agriculture and the United States Bureau of Standards. For a full discussion of the turpentine and rosin industry, including not only statistics but methods of production, see "Turpentine and Rosin," in *Thirteenth Census of the United States*, vol. x, *Manufactures*, 1910 (Washington, 1913); *Forest Products of the United States*, Appendix on "Naval Stores"; also *Naval Stores*

Review (Savannah, Ga., current) and *Bulletins of United States Forestry Service*, especially Nos. 90, 116, and 119. See LINSEED; OAKUM; ROSIN; TAR; TURPENTINE; VARNISH.

NAVAL SURGEON. See SURGEON, MILITARY AND NAVAL.

NAVAL TACTICS. See TACTICS, NAVAL.

NAVAL TARGET PRACTICE. See TARGET PRACTICE, NAVAL.

NAVAL UNIFORMS. See UNIFORMS, MILITARY AND NAVAL.

NAVAL VETERANS, NATIONAL ASSOCIATION OF. A patriotic society organized in New York City in January, 1887, having for its chief purpose the preservation of the traditions and memories of the United States navy during the Civil War. It is also beneficial to its members. It admits to membership any officer or enlisted man who served in the United States navy, United States marine corps, or United States revenue marine service during any portion of the time between April 12, 1861, and Aug. 25, 1865, and who has been honorably discharged or has honorably resigned. The organization has a membership of about 7000, in 20 associations.

NAVAL WAR COLLEGE. See NAVAL SCHOOLS OF INSTRUCTION.

NAVARINO, nä'vä-rē'nō. A town of Greece, in the Morea and in the Nomarchy of Messenia, at the southern extremity of the Bay of Navarino (Map: Greece, C 7). It is officially called Pylos. The ancient Pylos was at the northern extremity of the bay, and is now called Palæokastro and Palæo-Navarino. Pop., 1909, about 2100, according to Baedeker. Along the front of the bay stretches the island of Sphagia, or Sphacteria (q.v.). In 1492 the Turks captured Navarino, and held it, with two or three short periods of interruption, till 1821, when it passed into the hands of the Greeks. In 1825 it was taken by Ibrahim Pasha, and on Oct. 20, 1827, in the Bay of Navarino, the allied British, French, and Russian fleets, numbering 24 ships and commanded by the British admiral Sir Edward Codrington, defeated the combined Turkish and Egyptian fleets, comprising 89 ships of war. In this battle 60 of the Ottoman ships were destroyed outright and the rest were driven ashore in a shattered condition. The Turks lost 6000 men, while less than 200 of the allies were killed. The battle of Navarino is one of the great battles of history, since it brought about the achievement of Greek independence. See GREECE, *History*, paragraph *The War for Independence*. Consult *Memoir of Sir Edward Codrington*, by his daughter (1873), and K. Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909).

NAVARRAISE, nä'vä rāz', LA. An opera by Massenet (q.v.), first produced in London, June 20, 1894; in the United States, Dec. 11, 1895 (New York).

NAVARRE, nä'vär'. A former independent kingdom on both sides of the western Pyrenees, now constituting the Spanish Province of Navarra (capital Pamplona) and part of the French Department of Basses-Pyrénées. The Province of Navarra has an area of about 4055 square miles. A large portion consists of wooded mountains and well-watered valleys. The region about Pamplona is a treeless plateau. In the south, in the valley of the Ebro, is a fruitful district, called the Ribera (shore). In the southeast is a barren salt steppe. The region is drained by the Ebro, its affluents, the Ega and Aragon, the Arga, an affluent of the Aragon, and the Bidassoa. The population of the province was 307,669 in 1900.

History. This territory was occupied in ancient times by the Vascones, the present stock of the Basques and Gascons, and they were never entirely subjugated by the Romans. The Visigoths met with sturdy resistance from the Basques, and had to content themselves with a nominal overlordship. The Basques were enabled to maintain some independence even during the Saracen conquest. Charles the Great, towards the close of the eighth century, conquered their country and made it a part of the Spanish mark. It soon became independent of the Franks, and for a time its history is very imperfectly known. Apparently Sancho Garcia (905–925), who wrested the region of the upper Ebro from the Saracens, was the first to bear the title of King of Navarre. In the form of government the Basque influence and the tribal feelings were strong and the governmental institutions were primitive. The King was elected, and was limited in his power by a council of 12 nobles. The Kingdom developed rapidly by conquests. Sancho III, the Great, who died in 1035, was also King of Castile, and Aragon was under his control as a dependency of Navarre. He divided his Kingdom among his three sons. Sancho IV of Navarre was murdered in 1076, and the nobles chose King Sancho of Aragon as their ruler. Until 1134 Navarre was united with Aragon (q.v.). After the death of Alfonso the Battler the people of Navarre chose the son of Sancho IV as King and recovered their independence. The country continued under this dynasty for 100 years, but Navarre, shut in by Castile and Aragon, was prevented from developing by conquests from the Moors. In 1234 Navarre passed by inheritance to Champagne. Queen Joanna of Navarre married Philip IV of France in 1284, and from that time until the extinction of the Capetian dynasty, in 1328, the history of Navarre was intimately connected with that country. Then the kingdom went, as a dowry, to Philip of Evreux, who married Joanna, daughter of Louis X. Her son was Charles the Bad. (See CHARLES II OF NAVARRE.) His granddaughter Blanche married King John of Aragon, and Navarre was connected with Aragon from 1458 until 1479. John's daughter, Eleanora, who succeeded to the throne of Navarre in 1479, was married to Gaston de Foix, Viscount of Béarn, and thus Béarn was united with Navarre. Eleanora died soon after her accession and was succeeded by Francis Phœbus. His successor, Catharine de Foix, married in 1484 a French noble, Jean d'Albret. In 1512 Ferdinand of Aragon conquered what is now the Spanish portion of Navarre. The Kingdom was thus reduced to a small district to the north of the Pyrenees. Jeanne d'Albret married in 1548 Antoine de Bourbon. Their son, Henry, ascended the throne of Navarre in 1572, and in 1589 became King of France as Henry IV. Navarre was united to France by decree in 1607, but down through Charles X all French kings bore also the title of King of Navarre.

Bibliography. Nicholas de Bordenave, *Histoire de Béarn et Navarre* (Paris, 1873); G. B. de Lagrèze, *La Navarre française* (2 vols., ib., 1881–82); Hermilio de Oloriz, *Resumen historico del antiguo reino de Navarra* (Pamplona,

1887); José de Moret, *Anales del reino de Navarra* (9 vols., Toulouse, 1890–92); Jean de Jaurgain, *Etude historique et critique sur les origines du royaume de Navarre* (Paris, 1897); id., *La Vasconie* (ib., 1898).

NAVARRE, Margaret of. See Margaret of Navarre.

NAVARRETE, nä'vä-rā'tā, Domingo Fernández (1610–89). A Spanish missionary. He was born at Peñafiel, Old Castile, entered the Dominican Order, and, after passing some time in Mexico, went (1647) to the Philippine Islands, where he became professor of theology at Manila. Later he made a missionary journey into the interior of China and resided there for a number of years, becoming in time the head of his order in China. During a persecution he was imprisoned at Canton, but escaped and reached home in 1673. In 1677 he became Archbishop of Santo Domingo. He published the first volume of his work, *Tratados históricos, políticos, éticos y religiosos de la monarquía de China* (1676), but the second volume was suppressed by the Inquisition. A projected third volume was never published. Consult *Churchill's Collection of Voyages and Travels*, vol. i (London, 1744).

NAVARRETE, Francisco Manuel de (1768–1809). A Mexican poet, born at Zamora. He entered the Franciscan Order and ultimately became professor of Latin at the University of Valladolid. He attained some reputation, especially for his bucolic poetry. A collection of some of his works was printed as *Entretenimientos poéticos del P. Navarrete* (Mexico, 1823; 2d ed., Paris, 1835).

NAVARRETE, Juan Fernández de (1526–79), surnamed El Mudo (the mute). A Spanish biblical painter, born at Logroño. He studied in different parts of Italy, especially (so says the usual account) at Venice under Titian, and returned to Spain after 20 years, with his reputation well established. In 1568 he was made painter to the King and was employed on the decorations for the Escorial. Among those still surviving are a "St. Jerome," "Christ at the Pillar," "The Nativity," "The Martyrdom of St. James," and a "Holy Family." In 1576 he painted his most famous picture, "Abraham and the Three Angels," for the Escorial, and in 1577–78 he further painted eight pictures representing the "Apostles," the "Evangelists," "St. Paul," and "St. Barnabas." Navarrete's manner and warm coloring show the influence of his master, Titian, and account for his second surname "the Spanish Titian." He plays an important part in the technical development of the Spanish school.

NAVARRETE, Martín Fernández de (1765–1844). A Spanish navigator and author, born at Avalos, Logroño, Spain. He entered the Spanish navy in 1780, served in the West Indies and in the Mediterranean, and took part in the combined French and Spanish attack on Gibraltar in 1782. He became a lieutenant in 1789, and was commissioned to collect documents relating to the history of the Spanish navy. From 1796 to 1808 he was detailed on special service in the Department of Marine, resigning in the latter year rather than recognize Joseph Bonaparte. He again took office after the restoration, became a recognized authority on naval affairs, and in 1823 was appointed director of the hydrographic office. At 27 he had been elected to the Royal Spanish Academy of the Language; and he was a member of various other learned bodies, including the Royal Academy of History, of which he became permanent director in 1824. He was chosen Senator and made a Councilor of State, and in 1841 became a corresponding member of the Institut de France. His greatest work was his *Colección de los viajes y descubrimientos que hicieron por mar los españoles desde fines del siglo XV* (7 vols., 1825–65). He also wrote a *Life of Cervantes*, published with a new edition of *Don Quixote* (1820), and left material for two posthumous works, *Disertación sobre la historia de la náutica* (1846) and *Biblioteca marítima española* (1851). He helped establish the publication, by the Royal Academy of History, of the *Colección de documentos inéditos para la historia de España*, and saw the first four volumes through the press. The set now contains 112 volumes.

NAVARRO, nä-vä'rō, José Francisco de (1823–1909). An engineer and financier, born in San Sebastian, Spain. He was prepared for the navy, but in 1841 came to the United States, where he received his English education in the Jesuit College at Baltimore. He visited South America and later settled in Cuba, where he took up the study of mechanics and railroading and became a member of a large mercantile firm. In 1855 he came to New York and there founded the first line of steamships between New York and Brazil (1863). He also became interested in a number of commercial projects, and in 1878 was one of the constructors of the Metropolitan Elevated Railway. He built one of the first large modern apartment houses in New York.

NAVAR'RO, Madame de. See Anderson, Mary Antoinette.

NAVARRO, Pedro (c.1460–c.1528). A Spanish general, who greatly developed the use of mines in war. In 1500 he was employed by Gonsalvo de Córdoba in the campaign against Naples. He was very successful in his use of mines against the famous Castello Nuovo in 1503, and was made Count of Alvetto, or Olivetto, by Ferdinand of Aragon. In 1508 he helped materially in the capture of Vélez de Gomera (the Peñón de la Gomera) by inventing a kind of floating battery, and in 1509 he did good service under Cardinal Cisneros in the conquest of Orán. After covering in masterly fashion the orderly retreat of the Spanish forces at Ravenna (1512), he was taken prisoner by the French. The King of Aragon refused to pay his ransom, and after languishing in prison nearly three years, Navarro was enabled to join the French army. He contributed largely to the success of the campaign of Marignano (1515). For a life of Navarro, consult Martín de los Heros, in *Colección de documentos inéditos para la historia de España*, vol. xxv (Madrid, 1854).

NAVAS DE TOLOSA, nä'väs dā tō-lō'sä, Las. A village of Andalusia, Spain, 37 miles north of Jaén, the scene of a battle (July 16, 1212) between Alfonso VIII of Castile, aided by a large army of Crusaders, chiefly French and English, and an army of Almohades under Mohammed au Nâsir. The Christians were victorious and broke Mohammedan power in Spain.

NAVASOTA, năv'ä-sō'tä. A city in Grimes Co., Tex., 71 miles northwest of Houston, on the Brazos and Navasota rivers and on the Houston and Texas Central, the Gulf, Colorado,

and Santa Fe, and the International and Great Northern railroads (Map: Texas, E 4). Noteworthy features include the city-hall and high-school buildings and Washington Park. It has a cotton gin, compress, two cottonseed-oil mills, a cooperage, silo factory, and a creamery. A lock and dam on the Brazos River has been constructed here. Pop., 1890, 2997; 1900, 3857; 1910, 3284.

NAVASSA, nou-ȧs'sȧ. A small island, measuring about 1⅛ by 2¼ miles, in the West Indies, between Jamaica and Haiti, in lat. 18° 25′ N., long. 75° 5′ W. (Map: West Indies, D 3). It has no permanent population. The island is chiefly noted for the deposits of phosphate rock (presumably formed from bird guano) which cover the greater part of its surface and which have been exploited by an American company. Consult D'Invilliers, "Phosphate Deposits of the Island of Navassa," in *Bulletin of the Geological Society of America*, vol. ii, pp. 75–84 (1891).

NAVE (ML. *navis*, nave of a church, ship, Lat. *navis*, ship). *Primarily*, in church architecture, that portion of a church between the entrance and the choir or chancel; in cruciform churches, between the entrance and the crossing of the transepts. As most churches are oriented (see ORIENTATION), this means generally the long western arm of a cruciform church. *Secondarily*, the main central body of the church; particularly, in a church of several aisles, the central portion between the side aisles, usually much broader and loftier than the side aisles. (See AISLE.) Thus in the first sense the nave includes the side aisles, but extends only up to the crossing; in the second sense it denotes the broad and lofty central longitudinal division of the church, in the eastern as well as the western arm of the cross. These are difficulties to be overcome only by the use of explanatory phrases. The cathedrals of Carcassonne and Poitiers in France, of Erfurt and many "hall churches" in Germany, the cathedral of Perugia in Italy, and that of Vienna in Austria, have naves and aisles of approximately the same height, but the central division remains the widest and is still the nave. In the ordinary form of church the nave may be covered with a ceiling of wood or with vaulting; its elevation internally comprises usually three stories—the piers and pier arches or the columns, which separate it from the side aisles, the triforium (q.v.), and the clear-story (q.v.), whose windows admit light above the roofs of the side aisles.

The same use of the term for the middle and widest and highest division exists in the description of a Roman basilica, or bath establishment (thermæ; see BATH), or any building which is lighted in part by windows in the wall of a higher division rising above the roofs of the lower divisions; thus, it is disputed whether the middle part of the Ulpian basilica at Rome was roofed and was a real nave, or open to the sky like a court.

A considerable number of English churches and a few in France have two equal aisles, divided by a single row of piers and arches and having each its own gabled roof; such churches are said to be double-naved.

NA'VEL. The umbilicus or navel is a round or oval depression in the median line of the abdominal wall, marking the site of attachment of the umbilical cord (q.v.), or funis, in the fœtus. See OBSTETRICS.

NAVERO, EMILIANO GONZÁLEZ. See GONZÁLEZ NAVERO, EMILIANO.

NAVESINK (năv'e-sĭnk) **HIGHLANDS.** A chain of hills running nearly northeast and southwest and forming a bold headland west of the south end of Sandy Hook, in Monmouth Co., N. J. (Map: New Jersey, D 3). They are important landmarks for ships approaching New York. On them is installed a first-class lighthouse, which shows a flashing white light, 246 feet above the sea, and visible for 22¼ nautical miles. The adjacent region, which is very beautiful and easily accessible from New York City, attracts many visitors.

NAVES LIBURNÆ. See LIBURNIA.

NAVEZ, nȧ'vȧ', FRANÇOIS (1787–1869). A Belgian portrait, historical, and genre painter. He was born at Charleroi and first studied under Joseph François. He was a pupil of the academies of Brussels and Ghent, and later studied with David, in whose manner his works are executed. From 1817 to 1822 Navez was at Rome, after which he settled permanently in Belgium, being made director of the Brussels Academy in 1839. His severely classic style is relieved by a touch of realism, and his portraits and drawings show considerable warmth of feeling. He is well represented in the Modern Gallery, Brussels, by eight portraits, including one of David, and four historical canvases. In the Rijks-Museum, Amsterdam, are "Elijah Raising the Shunamite's Son" (1821) and the "Meeting of Isaac and Rebecca" (1826). His "Spinning Women of Fondi" (1845) is in the New Pinakothek, Munich.

NAVIC'ULAR DISEASE (Lat. *navicularia*, relating to ships, from *navicula*, dim. of *navis*, ship). A disease of the horse, consisting in an inflammation of the sesamoid sheath, induced by repeated bruising or laceration and complicated in many cases by inflammation and caries of the navicular bone, at the point within the hollow of the fetlock where it passes over the navicular bone. It is most common among the lighter breeds of horses, and especially where the pasterns are upright, toes outturned, and work is early and severe on hard roads. It soon gives rise to a short tripping yet cautious gait, undue wear of the toe of the shoe, wasting of the muscles of the shoulder, and projecting or pointing of the affected limb while standing. But few cases of navicular disease recover. Give rest, remove the shoe, shorten the toe, rasp the heel away, and apply hot poultices, changed every few hours, or a cantharides blister, repeated after three or four days. Laxative medicine and bran mashes may be ordered. After a few days, and when the heat and tenderness abate, cold applications should be given; after another week the animal may be placed for two months in a grass field, where the ground is soft and moist, or, if sufficiently strong, at slow farm work on soft land. Division of the nerve going to the foot removes sensation, and consequently lameness, and hence is useful in relieving animals intended for breeding purposes or for slow work. The operation, however, is not to be recommended where fast work is required, for the animal, being insensible to pain, uses the limb as if nothing were amiss, and the disease rapidly becomes worse. Consult Leonard Pearson and others, *Special Report on Diseases of the Horse*, published by the United States Bureau of Animal Industry (rev. ed., Washington, 1907).

NAVIES (OF. *navie*, from Lat. *navia*, ship, variant of *navis*, Gk. *ναῦς*, *naus*, Skt. *nāu*, OIcel. *nōr*, ship, *naust*, naval station; connected with Gk. *νεῖν*, *nein*, to swim). The term navy is applied to the armed force of a country which operates on the water or in coast and harbor defense. The history of navies goes back to the earliest days of ships, for no sooner were such craft built than their value as weapons of war was at once seen. The Chinese were among the earliest of navigators, but little is known concerning their ancient fighting craft. The most ancient war vessels of which the details are known were those of the Egyptians, and the date assigned to them is 3000 B.C. At the same time it is evident that there were many other peoples that possessed fighting vessels, and that the Egyptians were far from paramount; for they had repeated naval combats with the Mysians, Phocæans, and Phœnicians, and probably also with the Pelasgians, Daunians, Oscans, Cretans, and Sicilians. It is therefore impossible to fix any sort of priority to the possession of naval defense. Herodotus says: "These Phocæans were the first of all the Greeks who undertook long voyages, and they are the people who discovered the Adriatic and Tyrrhenian seas, and Iberia and Tartessus [a part of modern Spain]. They made their voyages in fifty-oared galleys and not in merchant ships." At this time, and for a long time subsequent and anterior, the shapes of merchant and war vessels were quite different, the former being broad and suitable for carrying cargo and the latter narrow and sharp so as to make speed. In addition, war vessels were built with rams and other warlike appurtenances, while merchant vessels made a much greater use of sails.

The greatest seafaring people of antiquity were the Phœnicians. They occupied the coast of Asia Minor, but the coast alone, for their territory was only from 5 to 15 miles wide. Even this comparatively small area did not form a single state, for the Phœnicians were a race, not a compact nation, and usually consisted of several communities independent of each other. The principal cities were Tyre and Sidon, and each had its own government. From the founding of Tyre (about 2730 B.C.) till 1600 the Babylonian influence in Phœnicia was probably paramount. Then the country was conquered by Egypt, which held the suzerainty until the Egyptian power began to decline (about 1200 B.C.). From that time until 870 the Phœnicians were independent of foreign control and had command of the sea, both in a naval and commercial sense. Of their cities, Tyre ultimately took the lead in wealth and power, reaching its zenith about 1000 B.C., when "a Tyrian sea" became "a proverbial expression for a sea whose navigation was prohibited to all but those who claimed the ownership thereof."

In 870 the Assyrian advance to the west reached Phœnicia. From this time until 650 B.C. the Phœnician cities usually paid tribute to Assyria, but there were frequent unsuccessful revolts. Phœnician power was now waning, but so was that of Assyria. In 650 the Tyrians freed themselves from their suzerains, but the devastating wars of the past 200 years had so reduced the male population that, soon after the reassertion of independence, their slaves rose and seized the city. Then the Egyptians made themselves masters of the country, but in 605 the Chaldæans drove them out. Revolts continued, Tyre withstanding a siege of 13 years (587–574); but in 538 the country passed under Persian control without much fighting. Though the parent states were now absorbed into the Persian Empire, many of the colonies were flourishing. In the sixth century Carthage declared its independence, and, though it never attained the naval or commercial supremacy of Tyre, for several centuries it divided with the Greeks the control of the Mediterranean. At the end of the fourth century Alexander the Great conquered Phœnicia, the country lost its last semblance of self-government, and its trade and sea power passed to the Alexandrians, Greeks, and Carthaginians. During the various periods in which the Phœnicians formed suzerain states under great land powers they manned and operated the war vessels of their overlords.

The Greeks were early competitors of the Phœnicians in trade and naval power. Like their rivals, the Greeks of Asia Minor passed through the same vicissitudes of subjection and acted as the naval forces of their conquerors. The European Greeks, equally good sailors, retained their independence and in the battle of Salamis (480 B.C.) overwhelmingly defeated the Persian fleet, which was largely manned by their Asiatic brethren. Internal dissensions prevented the extension of Greek sea power, the naval supremacy of Athens being destroyed in the Peloponnesian War (431–404 B.C.).

The early successes of Rome were on land. When it attempted to extend its conquests to Africa a strong naval force was necessary. In 260 B.C. the newly constructed Roman fleet destroyed the Carthaginian at Mylæ, and the overwhelming defeat of the Egyptian naval forces at Actium (31 B.C.) left Rome undisturbed mistress of the Mediterranean. The lack of opposition on the water caused the Roman naval force to be greatly reduced, and after the transfer of the seat of government to Constantinople, the navy almost disappeared until revived in the war against the Vandals. After the reconquest of Africa the fleet again declined. In the seventh century the rise of the Saracen power and the development of its naval forces compelled the Empire to build and organize an efficient fleet whose power and success were greatly augmented by the discovery of Greek fire (q.v.), the manufacture of which was kept a state secret. The dissensions in the Mohammedan world affected its naval forces, and their decline brought about a similar condition in those of the Empire. But in the ninth century the Saracens again gathered a strong force on the water, and the Imperial fleet was once more strengthened, and remained in this condition until the twelfth century, when the new Mohammedan conquests so reduced the territory of the Empire that its finances could no longer stand the burden of a strong navy.

In the meantime the commercial states of Italy had absorbed the greater part of Mediterranean sea-borne trade, and they built war vessels to protect it and to defend their coasts and colonies. Venice and Genoa were the leaders and rivals, and they, especially the former, were largely engaged in transporting the crusading forces to and from Palestine. They also settled at various places in the islands and on adjacent coasts, the settlement in many cases leading to seizure of the littoral and the formation of colonies. More than 200,000 were in Constantinople, and this indirectly led to the capture of the city in 1204 and the formation of the Latin Empire dominated by Venice. After the Vene-

tians were driven out the Empire again built up its fleet to some extent, but pressure from all sides soon caused the Imperial power on land and sea to sink to insignificance. Neither Venice, Genoa, nor the Mohammedan powers ever became paramount, though at times administering severe defeats to their opponents. The rivalry of Venice and Genoa came to an end in 1380 by the victory of Pisani at Chioggia, in which the Genoese fleet was destroyed and Genoese naval power so severely broken that it never fully recovered. Venice and the Mohammedans then continued their rivalry with varying success until the discovery of the passage around Good Hope caused the decadence of Venetian prosperity and the battle of Lepanto destroyed the Mohammedan sea power.

Early in the Middle Ages the countries about the Baltic and the North Sea, which had for centuries been sending out rovers and freebooters in every direction, began to develop organized naval forces. The early expeditions of the Norsemen showed this, though the actual warfare was mostly upon land. The ancient songs and stories of the Danes and Scandinavians contain many accounts of sea fighting, but these are so intermixed with fable, national boasting, and poetic imagery that it is difficult to separate fact from fiction. It is not until the ninth or tenth century that we begin to reach anything approaching reliable history. The Saxons (British) fought sea battles, in which many vessels were engaged, early in the ninth century, and in the last years of that century King Alfred organized a strong naval force The first great sea fight of which we have any definite knowledge was that of Harald Haarfagr, King of Norway, against the petty kings of the northern part of the country. He spent three years in building ships and gathering men, but achieved a complete victory in 872. One of the greatest of the early sea fights of which we have full information was that between Olaf Trygavesson, great-grandson of Harald, and the allied powers of Denmark and Vendland, which were assisted by the Norwegians of the Province of Viken. Olaf's ships were numerous and some of them were 150 feet in length, but the forces of his opponents were still greater, and, though he made a brave and able defensive fight, he was defeated and killed. In 1014 Olaf the Saint assisted the Saxons to capture London, which was occupied by the Danes. This fight is interesting from the fact that it was made by a fleet fighting against land forces. Under Harald Haardraade, in 1061, the Norwegian fleet destroyed the Danish in a fiercely fought action at Nisaa. Harald then started with a fleet and an army to invade England, ostensibly to place Earl Tostig, the brother of the British King Harold, upon the throne. The enterprise was unsuccessful and Harald was killed at the battle of Stamford Bridge, Sept. 25, 1066, three days before the landing of the Normans and less than three weeks before the battle of Hastings. After the death of Harald Haardraade the Norse sea power declined, though in the next century King Sigurd led an expedition into the Mediterranean, which was successful against the Moors in Spain and against the pirates of the Mediterranean and which, in alliance with Baldwin I of Jerusalem, took and sacked Sidon.

Spain made a strong effort to become a great maritime nation, but ultimately failed, partly from governmental mismanagement, partly from various causes connected with the temperament of her people or with the country's environment. In 1588 she sustained a crushing blow in the defeat of the "Invincible Armada," which was organized to conquer England.

Long before this, however, Neptune's sceptre had definitely passed to northern nations, the English and the Dutch. But good sailors as the Dutch were, they were too few in number and too poor to cope long with their great rival, and Britain became mistress of the waves. Alfred the Great is commonly regarded as the founder of the British navy. A naval force had existed before his time, but it lacked the organization and effectiveness of the fleet developed by Alfred, in which the vessels were especially designed for fighting and were adapted to the country's needs. Alfred's grandson Athelstan fostered the maritime spirit of his people as regards both commerce and naval affairs. He granted the title of thane to any merchant who had made three voyages on the high seas in his own ships freighted at his own expense, though this was a title previously confined to men of noble rank and extensive landed possessions. Edwy the All Fair is said to have had large fleets; and under Canute the Great English maritime commerce assumed large dimensions. After the Normans had firmly established their rule they also encouraged the growth of shipping and provided for its defense. Henry II and Richard Cœur de Lion are both known to have had strong naval forces, and under John it was decreed "that any ships of other nations, though at peace and in amity with England, should be made lawful prizes if they refused to strike to the royal flag." Such an arrogant assumption is not likely to have been made unless the power to enforce it had existed, and we know that John's fleet gained a victory over the French in the harbor of Damme.

During the century which followed a sort of piratical war existed between England and France and the coasts of both were ravaged by the freebooters on either side. At length, in 1340, the English fleet, commanded by Edward III in person, won the great victory of Sluys, the French losing nearly their whole force of 300 vessels besides 20,000 men killed, wounded, and prisoners. According to Charnock this was the first action in which beaked galleys propelled by oars were wholly laid aside and reliance placed upon vessels propelled chiefly by sails. From this time there was no particular improvement in the British navy (except that heavy guns were placed on board ship) until the reign of Henry VIII, who gave great attention to the fleet, improving the ordnance, reorganizing the *personnel*, and building several relatively very large vessels, the most powerful being the *Henri Grace à Dieu*, commonly called the *Great Harry*. She carried 72 guns and 700 men, and her tonnage was between 1000 and 1500, the lack of uniformity in measurement for tonnage making it difficult to ascertain the correct figures.

Henry was the first sovereign in Europe to establish a corps of officers for sea service only, and he did more to improve the navy than any preceding monarch, using improved models for his ships and employing Italian shipwrights (then the best in the world) in their construction. The construction and mounting of the heavy guns were improved to such an extent that the design of both the guns and the gun carriages used in the later ships of his reign remained unchanged for nearly 200 years. He

also greatly increased the number of vessels and established the dockyards at Woolwich, Portsmouth, and Deptford. Edward VI and Mary paid but little attention to the fleet, but Elizabeth recognized its vital importance, again increasing the number of ships and their size besides improving the condition of the officers and gathering vast quantities of naval stores. From her reign until the present day the British navy, though not without rivals, has never been equaled but once or twice, and then the equality was of very short duration.

Modern naval development may be said to have begun with the rapid increase in the size of ships which took place at the end of the fifteenth century and the contemporaneous improvement in ordnance (see GUNS, NAVAL), and mediæval naval history finally closed with the battle of Lepanto, the last great action in which oar-propelled galleys played an important part. From this time the sailing man-of-war was gradually improved in size, speed, and power until near the middle of the nineteenth century, when sails were replaced as a motive power by steam. During the whole of this period the British navy maintained its supremacy, though the temporary rise of the Dutch naval power in the seventeenth century seriously threatened it for a short time, and during a brief interval under Louis XIV the French maintained a fleet which was superior to the British, and with which Admiral Tourville defeated the combined British and Dutch forces off Beachey Head in 1690. Two years later the French fleet was destroyed by the same allies at La Hogue. Thenceforward the superiority of the British navy has been unquestionable. Though it lost many single-ship actions and minor engagements with the French and Americans, no navy could stand before its full strength.

At the close of the Napoleonic wars the great naval powers were Great Britain (far in the lead) and France. In the second rank were Spain, Russia, and the Netherlands. In the third were Turkey, Austria, Denmark, Norway, Sweden, the United States, the Two Sicilies, Portugal, and Prussia. In 1860 the conditions were much the same except that the United States had risen to the second category, the Netherlands had sunk to the third, the Kingdom of Italy was forming and the Two Sicilies tottering to its fall; while Greece, Brazil, Peru, Chile, and Argentina had organized naval forces.

During the period 1860–80 the naval powers of the world underwent many changes. During the Civil War the navy of the United States became enormously expanded, but the greater part of the ships were of no permanent value except for the special and unusual conditions existing in that struggle. At the close of operations all such craft were sold and many of the others laid up. Congress addressed itself to the task of reducing the debt and government expenses; and the naval appropriations were so greatly cut that the navy declined steadily until 1881, when it reached a condition of absolute nullity so far as the ships were concerned. Three new naval powers appeared in this period—Germany, Italy, and Japan—and one, the Two Sicilies, was suppressed. In 1867 the North German Confederation took over the Prussian navy and somewhat enlarged it. Some additions were made during the decade following the establishment of the Empire, but these were so moderate in amount that in 1880 it was still in the second rank of naval powers. The early history of the Italian service was different. Sardinia had begun to build a strong fleet before it became the Kingdom of Italy. The navy of the Two Sicilies was absorbed in it, but was no addition, and perhaps its inefficient condition rendered its incorporation detrimental to Italian naval efficiency. The vessels built between 1860 and 1866 were, however, very excellent for their date, and at the opening of the War of 1866 Italy was a naval power of the first rank. The disastrous battle of Lissa then caused a cessation in naval development, which continued until 1871, when Italy resumed building on a scale that brought her up to third or fourth in naval power in 1880. Russia started to reconstruct her fleet soon after the close of the Crimean War, but the vessels built previous to 1880 were not very formidable for seagoing purposes. Japan took a first step towards building up a navy by the purchase of the armored ram *Stonewall*, built for the Confederate government, in 1865. Four other small armor-clads and a few cruisers were acquired previous to 1880, but no hint of her naval ambitions had appeared at that time. The Turkish navy was reorganized in 1863, and from that time until the war with Russia (1877–78) it was being steadily strengthened by the addition of armored ships. The financial difficulties brought about by the war put an end to large naval expenditures for many years. Not only were no new vessels ordered, but the old ones were allowed to deteriorate.

The period of 1880–1900 was one of general naval renaissance. Powerful navies were greatly strengthened, weak navies made powerful. During this period France, Italy, and Russia built quite steadily, Italy and Russia gaining in relative power, France holding her own in 1880–90, but losing in the next decade. In 1889 Great Britain passed her first Naval Defense Act, providing for 70 vessels, 10 of which were battleships of the first class; and in the same year Germany adopted a five-year programme providing for four first-class battleships (the first ones in the German navy) and nine armored coast-defense vessels. The United States began the new navy in 1882, and Spain ordered her first battleship in the same year. In 1888 Greece and Chile ordered second-class battleships. During the second decade of this period the development of the various fleets proceeded rapidly. The United States and Germany made the greatest progress, France, Russia, and Italy retrograded slightly. Japan ordered her first battleships (two in number) and adopted a building policy which by 1920 placed her third in naval power and made her no mean antagonist for Great Britain or the United States. Increase of the navy was so strongly urged by President Roosevelt that by 1904 the American navy (including ships building) had reached second place. The impetus he gave was not sustained by his successors, and in less than two years after Roosevelt's retirement from office, Germany had passed us and France was gaining. This condition existed until 1916, when the early lessons of the war and the imminent danger that the United States would be drawn into the vortex awakened Congress to our naval retrogression and deficiencies. The resulting Naval Act of 1916–17 authorized the construction of 10 battleships and 6 battle cruisers of the most powerful class as well as a large number of light cruisers, destroyers and submarines — thereby more than doubling the effective strength of the fleet (upon completion of

the vessels), rendering it nearly equal to that of Great Britain and far superior to that of any other power. The Japanese adopted a new building programme in 1911–12 and were pushing it to completion when the projected increase in the United States fleet caused it to be greatly enlarged and the speed of construction to be notably accelerated. Including ships under construction, the net result was, on January 1, 1922, that in power of battleships and battle cruisers the United States fleet had become at least equal to that of Great Britain while the

DIMENSIONS, ARMAMENT, ARMOR, SPEED, ETC., OF THE DREADNOUGHT BATTLESHIPS AND BATTLE CRUISERS TO BE RETAINED BY THE FIVE PRINCIPAL NAVAL POWERS UNDER THE TERMS OF THE CONFERENCE ON THE LIMITATION OF ARMAMENTS.

NATIONS AND SHIPS	Completed	Displacement tons	Length on w. l. feet	Beam feet	Draft feet	Armor		Main battery		Speed knots
						Belt inches	Turret inches			
UNITED STATES:										
Florida, Utah	1911	21,825	510.0	88.2	30.1	11.0	12.0	10	12-in.	21.0
Arkansas, Wyoming	1912	26,000	554.0	93.2	29.7	11.0	12.0	12	12-in.	21.0
New York, Texas	1914	27,000	565.0	95.2	29.7	12.0	14.0	10	14-in.	21.5
Nevada, Oklahoma	1915	27,500	575.0	95.2	29.7	13.5	18.0	10	14-in.	21.0
Arizona, Pennsylvania	1916	31,400	600.0	97.0	29.7	14.0	18.0	12	14-in.	21.5
Mississippi, Idaho, New Mexico	1917–19	32,000	600.0	97.4	30.0	14.0	18.0	12	14-in.	21.0
California, Tennessee	1920–21	32,400	600.0	97.4	30.8	14.0	18.0	12	14-in.	21.0
Maryland, Colorado (bldg.) West Virginia (bldg.)	1922–23	32,600	600.0	97.4	31.3	16.0	18.0	8	16-in.	21.0
GREAT BRITAIN:										
Benbow, Emperor of India, Marlborough, Iron Duke	1914	25,000	580.0	90.0	28.0	13.5	12.0	10	13.5-in.	22.0
Queen Elizabeth, Barham, Malaya, Valiant, Warspite	1915–16	27,500	600.0	90.5	28.8	13.5	13.5	8	15-in.	25.0
Ramillies, Royal Oak, Resolution, Revenge, Royal Sovereign	1916–17	25,750	580.0	88.5	28.5	13.5	13.5	8	15-in.	23.0
Tiger	1914	28,500	700.0	90.5	28.5	9.0	9.0	8	13.5-in.	30.0
Renown, Repulse	1916	26,500	750.0	90.0	25.5	6.0	9.0	6	15-in.	32.0
Hood	1920	41,200	810.0	104.0	28.5	12.0	15.0	8	15-in.	31.0
Two new battle cruisers	....	35,000	....	...	...	to be built				
JAPAN:										
Fuso, Yamashiro	1915–17	30,600	630.0	94.0	28.5	12	12	12	14-in.	23.0
Ise, Hiuga	1917–18	31,260	640.0	94.0	28.5	12	12	12	14-in.	23.0
Nagato, Mutsu (bldg.)	1920–22	33,800	700.0	...	...	...	...	8	16-in.	23.5
Haruna, Hiyei, Kongo, Kirishima	1913–15	27,500	653.0	92.0	27.5	8	10	8	14-in.	27.5
FRANCE:										
Bretagne, Lorraine, Provence	1915–16	23,100	541.0	88.6	29.5	11	17	10	13.4-in.	20.0
Courbet, Jean Bart, Paris, France	1913–16	23,100	541.0	88.6	29.5	11	11	12	12-in.	20.0
ITALY:										
Andrea Doria, Caio Duilio	1915	22,562	575.3	91.8	29.0	10	10	13	12-in.	23.0
Giulio Cesare, Conte di Cavour	1915	22,023	557.0	91.8	29.0	10	10	13	12-in.	23.0
Dante Alighieri	1913	19,400	510.0	85.3	27.2	10	10	12	12-in.	24.0

Names of battle cruisers are in italics. Vessels uncompleted are marked (bldg.).

briefly described. In some cases, when the subject is not treated elsewhere, a short historical account is given.

Argentina. After possessing a very weak naval force for many years, Argentina acquired in 1874 her first armored vessels — two river monitors of 1500 tons. In 1878, a small third class battleship (4200 tons) was ordered and this was followed by two larger monitors and several protected cruisers about 1890. In 1895–98, four armored cruisers of about 7000 tons were ordered in Italy; and in 1910 two dreadnought battleships of 30,000 tons were ordered in the United States. The battleships and armored cruisers form the present effective fighting force and are supplemented by three cruisers of 3200 to 4500 tons, several gunboats, seven destroyers, eight torpedo boats, and a few auxiliaries. The average *personnel* is about 325 line or executive officers, 4 naval constructors, 30 medical officers, 95 engineers, 2 torpedo engineers, 21 electrical engineers, 80 paymasters and commissary officers, 8 chaplains, and 9500 petty officers and men. The navy yards are at Puerto Belgrano (Puerto Militar) on Bahia Blanca and at La Plata. The naval station at Tigre is a supply and repair establishment and the headquarters of the torpedo fleet.

Austria. The new Austrian state has no seaport. The navy of Austro-Hungary was abolished by the armistice of 1918 and the Treaty.

navy of Japan was more than half as formidable. At this time the Conference on the Limitation of Armaments (see VOL. XXIV) was completing its labors whereby all building of battleships, and battle cruisers, except replacements, was interdicted for ten years. The five great powers agreed to reduce the number of their capital ships to tonnages as follows: Great Britain, 525,000 tons; United States, 525,000; Japan, 315,000; France, 175,000; Italy, 175,000. By the terms of the armistice of 1918 and the treaty of Versailles, the Turkish, Austro-Hungarian, and Bulgarian navies were abolished and the German fleet reduced to a nearly negligible quantity.

NAVIES OF THE WORLD IN 1922.

In the following paragraphs the present condition of the various navies of the world is

Belgium. Belgium has no organized navy but a naval commission has been formed to consider the subject and submit plans. The small existing force consists of a gunboat, 3 torpedo boats, and 2 submarines; and it is reported that 4 small vessels have been ordered in France.

Brazil. The navy of Brazil is the oldest of the South American naval establishments having been organized early in the nineteenth century before the Spanish colonies had achieved their independence. Its development and efficiency have at times been much disturbed by politics and it is one of the few naval services of the world which have taken a leading part in overturning their own existing governments. It played an important part in the overthrow of the Brazilian Empire and has twice since been the leading support of unsuccessful insurrections. Its first two armored vessels, built in 1864–65, were small and weak, but ten years later these were followed by two large monitors and a central battery ship. In 1883–85, the armored cruisers *Aquidaban* (5000 tons) and *Riachuelo* (5700 tons) were launched. Two small turret ships were built in France in 1900–01. In 1906, an extensive building programme provided for the construction of 3 dreadnought battleships of 19,000 tons, 3 scout cruisers of 3100 tons, 15 destroyers of 650 tons, 3 submarines, and a mine layer. Of these, 2 battleships, 2 cruisers, 10 destroyers, and 3 submarines were completed and are now in service. A third battleship of 27,500 tons was, for financial reasons, sold to Turkey. Not being ready for delivery when the Great War broke out, she was commandeered by the British government, completed, and named the *Agincourt*. She was afterwards resold to the Brazilian government her name being changed according to reports to *Rio de Janeiro*. The 19,000-ton battleships were rebuilt in the United States. The effective navy in 1922 consisted of the 3 battleships, the 2 small turret ships (3112 tons) built in France, 2 river monitors built in Brazil, and the cruisers, destroyers, and submarines built pursuant to the 1906 programme. The principal navy yard is at Rio de Janeiro, as are also the naval academy, the naval college, the school for naval apprentices and the torpedo school; but there are naval stations at Para, Pernambuco, Santa Catalina, Ladares (Matto Grosso) and Bahia.

Bulgaria. The navy of Bulgaria was abolished by the armistice of 1918 and the Treaty.

Canada. The active vessels of the Canadian navy are 1 light cruiser of 3500 tons and 30 knots speed, 2 destroyers of 980 tons and 35 knots, 4 submarines, and two tenders for torpedo craft. The naval academy for officers and the training establishment for the enlisted force are at Halifax.

Chile. The navy of Chile is third in strength among the South American navies but it has an excellent reputation for efficiency and its capability in war is probably greater than the relative paper power of its fleet. The available active fleet consists of 1 battleship of 28,000 tons (launched in 1913), 1 armored cruiser of 8500 tons (1897), 1 of 7000 tons (1896), 1 small and old battleship of 6000 tons (1890), 5 cruisers (2000 to 4500 tons — launched 1890–1901), 4 flotilla leaders (1700 to 1850 tons), 8 destroyers (300 to 750 tons), several torpedo boats, and 6 submarines (450–520 tons). The *personnel* consists of 689 officers and 6058 men.

China. The Chinese navy is said to be in a very inefficient condition owing to lack of funds and the political disturbances of the past few years. It possesses no vessels of importance or of very recent construction. There are seven light cruisers of 1900 to 4300 tons (1898–1912), about a dozen gunboats, 3 destroyers of 400 tons (1912), and about 20 small torpedo boats. Two submarines of the *Medusa* type were under construction in Italy in 1921.

Colombia. The Colombian navy has a small cruiser of 1200 tons (1892) and seven gunboats.

Cuba. The vessels of the Cuban navy are a small cruiser of 2055 tons (1911) and four gunboats of 440 to 1300 tons (1895–1911).

Denmark. The Danish navy is the oldest in Europe. Denmark possessed naval forces before France became a kingdom, while England was a collection of petty monarchies and while the Arabs ruled all Spain. It has passed through many wars against superior power, but emerged from all with honor and sometimes with success. It was the first to build a sea-going turret ship, and its constructors were among the first to design practicable submarine boats. Though necessarily small, the present Danish navy has an excellent reputation as regards organization and efficiency. At the head of it is the Minister of Marine who is assisted by an officer of rank (usually a vice-admiral or rear-admiral) with the title of director general. The navy department is divided into four principal sections: (1) Secretariat; (2) Admiralty; (3) Commissariat; (4) Justice. The chief of the Secretariat is the director general; of the Admiralty, a captain in the navy. The two other sections have civilian heads. The only dockyard is the royal arsenal at Copenhagen. The present (1922) fleet consists of 5 small armored coast defence turret ships of 2200 to 4100 tons (1896–1918), 3 small light cruisers of 1280 to 3020 tons (1888–94), 5 mine-layers, several small gunboats, 20 torpedo boats of 108 to 300 tons (1911–19), 14 submarines of 204 to 370 tons, and several training vessels and other auxiliaries. The naval academy and postgraduate schools in torpedos, gunnery, and aviation are at Copenhagen which is also the headquarters of the training vessels for seamen and mechanics. According to the latest reports, the *personnel* consists of 1 vice-admiral, 2 rear-admirals, 17 captains, 45 commanders, 72 ober offiziere, and 7200 junior officers and enlisted men.

Ecuador. The navy of Ecuador was organized in 1908. A cruiser of 3600 tons (1896) and a torpedo gunboat of 858 tons (1896) were purchased from Chile at this time. A composite gunboat was bought from France in 1900. At last accounts, the torpedo gunboat only was fit for active service.

Egypt. Egypt has no organized navy but possesses a small cruiser of 1310 tons (1916), 10 sternwheel gunboats of 100 to 150 tons for service on the Nile, and several coastguard vessels.

Esthonia. The Esthonian government has organized a navy department and desires to maintain its present force which is as follows: 1 flotilla leader of 1600 tons (*ex-Capitan Kingsbergen*), 1 flotilla leader of 1800 tons (*ex-Autroil*), 1 gunboat of 875 tons (*ex-Bobr*), 2 smaller gunboats, 2 mine layers, 2 tugs, and 15 vedette boats. Nearly all of these vessels formerly belonged to the Russian government.

Finland. The Finnish navy consists of 1 gunboat of 875 tons (*ex-Gilyak*), 4 smaller gun-

boats, 6 torpedo boats, 2 mine layers, 2 trawlers. These vessels formerly belonged to the Russian government.

France. The success of the French navy in war has rarely been proportional to its strength in ships, guns, and men. This has been due to disturbing and disorganizing forces from without the service and they have prevented efficiency. From the fourteenth century to the end of the nineteenth, France was the second naval power of the world, and twice, for a few years, it was the most powerful. In 1860 it was nearly on a par with Great Britian but from that time onward it relatively declined, especially between 1885 and 1902. During this period, for financial reasons, a cheap substitute for the battleship was sought — first the torpedo boat, then the cruiser and the *guerre de course*, and lastly the submarine. But in 1902, the disorganizing influences which had existed for several years were eliminated and the construction of battleships was begun in earnest. But before the new building policy had made great headway the navy had fallen behind those of the United States and Germany. The forcible reduction of the German fleet by the armistice of 1918 and the almost simultaneous rise of Japan to third place leaves France fourth in naval power, a position she is likely to maintain for many years. The existing fleet and the vessels authorized or under construction are shown in the table at the end of this article. If the proceedings of the Washington Conference are finally and fully ratified by all of the five governments which are signatories, France will be required to scrap all her battleships except dreadnoughts. As none of these ships are of any serious value in modern war the loss will be trifling. The latest (1922) programme of new construction as approved by the French parliament provides for the building of 3 light cruisers of 8000 tons and 34 knots speed, 6 flotilla leaders of 2500 tons and 35 knots, 12 destroyers of 1400 tons and 32.5 knots, and 12 submarines of 1100 tons. It is understood that the partly completed battleship *Béarn* will be transformed into an airplane carrier.

Germany. Stripped by the terms of the armistice and the treaty of Versailles of every dreadnought battleship, battle cruiser, and submarine, and of all its effective light cruisers and destroyers, the German navy has, in the combined fighting power of its vessels, sunk below the navies of Spain, Brazil, and Argentina. By the terms of the treaty, the German navy is permitted to keep in commission not more than 6 battleships of the *Deutschland* or *Lothringen* type (pre-dreadnought battleships of 13,000 tons, four 11-inch guns, launched 1902–06), 6 light cruisers, 12 destroyers, and 12 torpedo boats. Including commissioned and warrant officers, the total *personnel* must not exceed 15,000. Except under specified conditions for replacement, Germany is by the terms of the treaty forbidden to construct or acquire any warships, and the construction or acquisition of any submarines whatsoever is prohibited. Vessels of war are only to have a fixed allowance of arms, munitions, and war material; and no stocks or reserves are allowed. To prevent the training of a large number of officers and men as reserves, the *personnel* of the navy must be recruited by voluntary engagements for a minimum period of twenty-five consecutive years for officers and of twelve consecutive years for petty officers and men under various restrictions. The existing fleet consists of: — 8 battleships of the *Deutschland* and *Lothringen* types, 6 of which are in active service, the other 2 in reserve and used as barracks; 8 old type light cruisers (2600 to 3200 tons — launched 1899–1905); 15 old destroyers (3 in reserve); and 16 torpedo boats (4 in reserve). These vessels are reported to be kept in good order and maintained in such state of efficiency as their age and character admit. The navy department is properly organized and discipline has been brought back from the chaos which existed in the last months of the war and for some time after its close.

Great Britain. While the British navy as regards capital ships is not much if at all superior to that of the United States, it is greatly superior in light cruisers and fleet auxiliaries which have no power in themselves but are necessary to the fleet to enable it to operate with full efficiency. Moreover, the possession of battle cruisers is an asset of great importance and the lack of such ships in the United States navy might prove disastrous in a war waged under certain conditions. The British fleet is indeed a well balanced force, so designed as to be able to exert its full power under any assignable circumstances without being hampered by lack of the proper means to support every class of operations. It is in fact such a weapon as a great insular power must possess — one that is capable of defending its shores and its lines of communication. England produces but little more than half its foodstuffs and not more than two-thirds the raw materials for its industries. The necessity of maintaining her ocean trade is therefore perfectly apparent and was amply proved during the great war. For years previous to the great war, Great Britain maintained the "two-power" standard. That is, she kept her fleet equal to the combined strength of any two other powers. The present apparent willingness of the government and people to accept parity in naval rank with the United States is doubtless compounded of many reasons — the elimination of Germany as a foe, the fair and even altruistic attitude of the United States in international affairs, present and probable future friendliness with the United States, financial advantages, and various minor reasons. A summary of the existing (1922) fleet is given in the tables at the end of this article. The tables give the number and tonnage of vessels to be scrapped if the agreements of the Conference on the Limitation of Armaments are fully ratified. See VOL. XXIV.

Greece. The nature of their country, with its extensive seacoast, numerous harbors, and geographical position, has made the Greeks a seafaring race. Modern Greece organized the semblance of a navy soon after the establishment of an independent government. This grew steadily in importance for forty years though still remaining more as an evidence of the national aspirations than a force which could be useful in war against any probable enemies. In 1867–69, two small armorclads of 1700 and 2000 tons were built, but it was not until after the decadence of the Turkish fleet which followed the Turko-Russian War (1877–78) that the Greek government began to seriously consider the possible use of naval power against her hereditary enemy. Between 1880 and 1885 half a dozen torpedo boats were purchased. In 1886, three small battleships were ordered. They were of 4800 tons, 17 knots speed,

strongly armed for their size, and very suitable to operate against the old and ill-cared-for ships of the Turks. In 1908 an armored cruiser of 10,000 tons was ordered in Italy and this was of much service in the Balkan war. A battle cruiser of 19,200 tons was building in Germany in 1914. This was seized by the Germans. A battleship of 24,000 tons was ordered in France early in 1914 but the outbreak of war prevented her construction. In June of that year, Greece purchased from the United States two battleships of 13,000 tons (*Idaho* and *Mississippi*). The existing (1922) navy consists of 2 battleships of 13,000 tons, 1 armored cruiser of 9956 tons, 3 small battleships of 4800 tons (rebuilt 1897–1900), 1 light cruiser of 2600 tons (built at Camden, N. J., 1914), 4 destroyers of 980 tons, 2 of 750 tons, 7 of 350 tons, 1 of 400 tons (ex-Austrian *Ulan*), 6 torpedo boats of 250 tons (ex-Austrian), 2 submarines (1911–12). In the early part of 1921, a British naval commission was assisting to reorganize the Greek navy but no complete report of its labors has been published. The naval budget for 1920–21 amounted to 91,036,201 drachmas (the gold drachma is worth 19.3 cents).

Haiti. The navy of Haiti consists of an old protected cruiser of 2245 tons and 18 knots speed (purchased from Italy), 4 armed steamers of 600 tons, 1 gunboat of 514 tons, 2 of 256 tons, and the president's yacht.

Italy. Italy has the greatest extent of seacoast of any country in Europe; moreover, part of this is on islands and in Africa, separated by water from the mainland of the peninsula. She produces very little fuel and but a small part of the raw material for her manufacturers. She is therefore vitally interested in naval power and has always maintained a naval force as great as her financial condition permitted. It was considerably strengthened after the union of the fleets of Sardinia and the Two Sicilies in 1861 but the new navy met disastrous defeat at Lissa in 1866. The service was reorganized and less than ten years later began a steady development until, about 1890, it was only overmatched by Great Britian and France. The rapid and continuous enlargement of the United States, German, and Japanese fleets, begun in the preceding decade, soon dropped it to sixth place, about on a par with the navy of Russia; but the latter has now sunk to a condition of innocuous inefficiency. The existing (1922) fleet consists of 5 dreadnought battleships with a total tonnage of 108,570, 4 older battleships (49,700 tons), 5 armored cruisers (46,208 tons), 9 fast light cruisers (1912–14 — 34,352 tons), 8 scouts or flotilla leaders (11,812 tons), 48 destroyers (31,625 tons), 93 (about 30 are likely to be condemned) torpedo boats (14,496 tons), 43 new submarines (17,140 tons). Under construction are 3 2158-ton scouts, 6 800-ton destroyers, 8 900-ton destroyers, 7 200-ton gunboats. The new program consists of 8 800-ton mine layers, 1 7000-ton oil transport, 4 600-ton submarines, 1 5000-ton light cruiser, 4 900-ton destroyers, 8 submarine chasers. The old battleships, cruisers, and other vessels are being rapidly sold or otherwise disposed of. The naval estimates for 1921–22 amount to 847,837,767 lire (paper, value fluctuating—the gold lira is worth 19.3 cents).

Japan. Unlike the other Allies, Japan incurred no great war debt. Indeed, at the close of the struggle, her finances were in better shape than they had ever been. She therefore felt able, as she never had before, to enter upon a building competition with the United States. So well did she perfect her plans, so rapidly did she produce ships of great power, that she was actually gaining upon the United States because of the leisurely way in which the latter was carrying out the great building programme of 1916; and it was less than two years ago that the tide began to set the other way. After the tide had definitely turned, Japan was probably glad to accept the American proposals as to limitation of armaments as they were more favorable to her than the probabilities of the easily discernible future. The existing (1922) navy of Japan is enumerated in the table at the end of this article.

Jugo-Slavia. The kingdom of Serbia had no seacoast but the new state of Jugo-Slavia fronts on the Adriatic for many miles and possesses a fine harbor at Cattaro and several of lesser importance. The vessels of the navy include two old Austrian armorclads — the old battleship *Erherzog Ferdinand Max* of 5000 tons, launched in 1865 and wholly unserviceable except as a depot ship; and the old battleship *Kronprinz Rudolf* of 6870 tons, launched in 1887, possibly serviceable, but wholly obsolete. The Allied powers alloted to the new kingdom 12 recently built torpedo boats. The government took possession of several ex-Austrian vessels on the Danube, the only one of importance being the Monitor *Bodrog* of 440 tons, carrying 3 4.7-inch guns. Several gunboats and vesesls of little naval value were seized in the port of Cattaro and elsewhere. The naval estimates for 1921–22 amount to 200 million dinari (about $7,000,000 in U. S. gold).

Latvia. There is as yet no organized naval force and the government possesses no war vessels of any kind but expects to purchase 8 destroyers and 4 submarines and keep on hand 1500 submarine mines.

Mexico. It is reported that the present (1922) government has disposed of all its war vessels except one or two small craft in the Pacific. The vessels reported sold consisted of four fairly efficient gunboats (built 1902–1904) of 980 to 1200 tons, 1 training ship of 1200 tons (1891), 1 torpedo transport of 1880 tons (1908), 5 torpedo boats, and several old gunboats of small size.

Netherlands. As far into antiquity as historical records and traditions extend, the inhabitants of the low countries were a seafaring race. Under Spanish rule their seagoing proclivities were greatly curbed but during the long years of rebellion against Spain the naval forces grew steadily and were of vital assistance to the shore operations. In 1607 the Dutch Admiral Heemskirk destroyed a Spanish fleet at Gibraltar. This led to a truce of a dozen years during which the Dutch navy and merchant marine developed rapidly. In 1639, during the renewed war with Spain, Admiral Martin Tromp annihilated a Spanish squadron off the Flemish coast and seven months later defeated and dispersed the combined Spanish and Portuguese fleets off the coast of England. In the period 1652–76 the Dutch fought many actions with the British and French fleets. In the majority of these they were victorious. In 1665, De Ruyter defeated the British fleet and compelled it to take refuge in the Thames; and,

in 1667, he entered the Medway and destroyed the British fleet as it lay at anchor. After the union with England under a common King (William III) the Dutch navy declined steadily until the Napoleonic wars when the Netherlands lost their independence and their fleet. Since then it has not been a naval force of the first rank. The naval administration under the Minister of Marine, consists of the chief of the general staff, the director of naval construction, the director of *personnel*, director of pilotage, the director of hydrographic service, the inspector of pay, provisions and clothing, and the medical inspector. The naval academy is at Willemsoord and the engineer school at Hellevetsluis. The existing (1922) fleet consists of: — 5 coast defence battleships of about 5000 tons and 1 of 6500 tons; 3 armored gunboats of 520 tons; 2 old protected cruisers of about 4000 tons; 10 mine layers; 8 destroyers of 480 tons; 18 torpedo boats of 130 to 320 tons; 12 submarines of 150 to 800 tons; and many old gunboats. There are under construction: — 2 light cruisers of 7050 tons and 30 knots; 2 mine layers of 750 tons; 1 depot ship for submarines of 2300 tons; 7 submarines. The naval estimates for 1921 were about $21,500,000 (at the par value of the florin). The average *personnel* of the navy is about 12,000.

Norway. In proportion to its population Norway has a larger mercantile marine and a greater seafaring population than any other country in the world, but the cost of modern fighting ships prevents the maintenance of a naval force equal to defending the coast against even ordinary aggression. With the exception of torpedo craft, submarines, and mining vessels (layers and sweepers), there have been no additions to the fleet in more than twenty years. The old vessels are being maintained in as great a state of efficiency as is practicable for their age. The government of the navy is confided to the Minister of Marine and Posts and the commanding officer of the navy. The former is an administrative office and constitutes the ministry proper; both branches have their headquarters at Christiania. The commanding officer of the navy is a rear-admiral who is a councilor of state. The executive officers of the active service and of the reserve are educated at the royal naval school. There is but a single military and naval post which is at Horten near Christiania. The only dockyard is there, but there are four other naval stations for the care and supply of vessels of the fleet. The existing force consists of: — 4 small coast-defence armorclads of 3920 to 4233 tons (completed 1898–1901), 3 gunboats of 387 to 1349 tons (1893–98), 4 destroyers of 380 to 540 tons, 26 torpedo boats of 84 to 220 tons, 4 submarines of 250 to 440 tons, 3 mining vessels of 335 to 755 tons.

Panama. The naval force of Panama consists of three small gunboats (400 to 643 tons) and two or three tugs and patrol boats.

Persia. There are no recent reports. At last accounts the naval force consisted of an armed merchant steamer of 1200 tons, a gunboat of 379 tons, and a royal yacht of 400 tons.

Peru. The Peruvian navy is being reorganized under the direction of officers of the United States navy who will give instruction in modern naval duties to the Peruvian officers. The existing (1922) fleet consists of: — 2 light cruisers (1906) of 3200 tons and 24 knots; 1 old armored cruiser (ex-*Dupuy de Lome* — launched 1890) of 6300 tons; 2 very old cruisers (1877 and 1881) of about 1700 tons; 1 destroyer of 492 tons; 2 submarines. Three submarines of 400 tons are under construction in Italy.

Poland. The law creating the Polish navy was passed in 1819 and a naval school for officers was soon afterwards established at Thorn. The building programme, recently announced, contemplates the acquisition of 4 small cruisers or gunboats and 16 torpedo boats (6 are ex-German and 5 of them are being repaired in England). One new gunboat of 500 tons is in commission and a similar one is building in Finland.

Portugal. The navy department forms part of the Ministry of the Marine and Colonies. It is presided over by a vice-admiral with the title of director general and consists of the divisions of (a) *personnel* and (b) material. The only naval dockyard is at Lisbon where is also located the naval college for officers of all branches of the service. The fleet consists of: — 4 old cruisers (1896–98) of 1635 to 4100 tons, about 20 gunboats of 100 to 729 tons at home and in the colonies, several auxiliary ships of no fighting value, 1 mine layer of 200 tons, 1 destroyer of 525 tons and 4 of 700, 6 small torpedo boats (ex-Austrian), and 4 submarines.

Rumania. The navy department is a branch of the Ministry of War and, until the reorganization of 1914, was completely overshadowed by the army, the officers even bearing army titles, and having a military education. The new plans provided for a naval school and a considerable increase in the fleet. The war interfered with the original plans but it is reported that the reconstructed service is in process of development though much hampered by the severe financial stringency common to all European countries which engaged in the war. The existing (1922) fleet consists of: — 1 old cruiser (1887) of 1320 tons; 9 seagoing gunboats; 5 small river gunboats of 100 tons; 4 river monitors of 600 tons; 3 ex-Austrian river monitors; 2 flotilla leaders of 1460 tons (1917–18 — purchased from Italy); 4 large destroyers of 1350 — 1450 tons recently built in Italy; 2 old destroyers (1888) of 578 tons; and 22 small torpedo boats.

Russia. When the Bolshevik government seized the vessels of the navy they murdered nearly all the officers and leading petty officers and seven or eight thousand of the men who refused to join them. The total number included in the massacre was estimated at about 10,000. This removed nearly all the capable officers and men and left the operation of the vessels to persons too ignorant to keep them even in a low state of efficiency. The only vessels that have been in active service during the past two or three years are submarines and destroyers. The four battle cruisers of 32,000 tons, which were building in 1914, have been launched; but there is neither money nor ability to complete them. The four new battleships of 23,000 tons cannot go to sea without extensive repairs. The older battleships are reduced to hulks; from many of them the guns have been removed to mount them in fortifications. Practically all the fast light cruisers have been destroyed or otherwise disposed of. There remain about 50 destroyers and 15 or 20 submarines in the Baltic and 20 destroyers and 6 or 8 submarines in the Black Sea. These are serviceable

but lack important supplies and are rapidly deteriorating. The only vessels being kept in cruising condition are the ships in which General Baron Wrangel made his flight from the Crimea. These are interned in the Algerian (French) port of Bizerta and are being cared for by the French navy. They consist of 1 dreadnought battleship of 22,795 tons, 1 old battleship of 11,390 tons, 1 light cruiser of 6850 tons, 6 large destroyers of 1120 to 1345 tons, 4 small destroyers, 4 submarines, 1 yacht, 1 transport of 16,250 tons and some other vessels of a size and character not reported.

Santo Domingo. The naval force consists of 3 gunboats of 322 to 1000 tons and some small craft.

NUMBER AND DISPLACEMENT OF VESSELS OF DIFFERENT CLASSES

BUILT AND BUILDING FOR THE PRINCIPAL NAVAL POWERS, JULY 1, 1922

TYPE	UNITED STATES				GREAT BRITAIN			
	Built		Building		Built		Building	
	No.	Tons	No.	Tons	No.	Tons	No.	Tons
Battleships (dreadnought) to be retained	16	460,650	2	65,200	22	548,190		
Battleships (dreadnought) to be scrapped	4	72,000	7	291,800	8	181,940		
Older battleships, to be scrapped	11	170,740	..	.....	...	(a)		
Battle cruisers to be retained	...	.....	..	.....	4	122,700		
Battle cruisers to be scrapped	...	.....	6	261,000	3	71,500	4	168,000
Fast cruisers and scouts	3	11,250	10	75,000	56	294,490		
Flotilla leaders	...	.....	..	.....	26	43,150		
Destroyers	303	330,000	3	3,645	166	184,300	6	7,468
Submarines	*80	*55,000	41	*35,000	87	76,980	7	9,275
Airplane carriers	...	.....	..	.....	6	79,560	2	34,270
Total	417	1,094,640	69	731,645	381	1,602,810	23	219,013
Total to be scrapped	15	242,740	13	552,800	11	253,440	4	168,000
Remaining	402	851,900	56	178,845	370	1,349,370	19	51,013

Total built and building — United States: Ships, 458; Tons, 1,030,745. Great Britain: Ships, 389; Tons, 1,400,383.

TYPE	JAPAN				FRANCE			
	Built		Building		Built		Building	
	No.	Tons	No.	Tons	No.	Tons	No.	Tons
Battleships (dreadnought) to be retained	5	157,520	1	33,800	7	163,037		
Battleships (dreadnought) to be scrapped	1	20,800	2	81,200				
Older battleships to be scrapped	6	99,587	...	.....	3	56,507		
Battle cruisers to be retained	4	110,000						
Battle cruisers to be scrapped	3	42,990	4	174,000				
Fast cruisers and scouts	9	42,450	11	61,620	5	21,302	3	24,000
Flotilla leaders	...	.....	8	15,200	...	.....	6	15,000
Destroyers	81	56,158	38	39,985	61	47,376	12	16,800
Submarines	*30	*18,000	*25	*30,000	50	32,000	12	13,200
Airplane carriers								
Total	140	547,505	79	435,805	126	320,222	33	69,000
Total to be scrapped	10	163,377	6	255,200	5	56,507		
Remaining	130	384,128	73	180,605	121	263,715	33	69,000

Total remaining built and building — Japan: Ships, 203; Tons, 564,733. France: Ships, 154; Tons, 332,715.

TYPE	ITALY			
	Built		Building	
	No.	Tons	No.	Tons
Battleships (dreadnought)	5	108,570		
Older battleships	4	49,700		
Battle cruisers				
Fast cruisers and scouts	9	34,352	1	5,000
Flotilla leaders	8	11,814	3	6,474
Destroyers	48	31,625	18	15,600
Submarines	43	17,140	4	2,400
Total	117	253,201	26	29,474

Total built and building — Ships, 143; Tons, 282,675.

Being allowed 175,000 tons of capital ships by the Armament Conference, Italy need not scrap any old battleships still in service.

* Approximate. Through the condemnation of old vessels and the completion or laying down of new construction, the figures are changing rapidly and the correct ones are not exactly known.

No vessels are included in these tables except combatant ships less than 20 years old. All armored cruisers, small torpedo boats, or other vessels of types universally regarded as inefficient for modern war are excluded. Such craft are being rapidly scrapped by all powers or relegated to auxiliary service.

Sarawak. Has 2 small gunboats of 118 and 175 tons.

Siam. The naval force consists of 1 old (1892) protected cruiser of 3000 tons; 4 gunboats of about 600 tons; several smaller gunboats; 3 small despatch vessels of 100 to 250 tons; 3 destroyers of 380 tons and 1 of 980 tons; and 3 torpedo boats of 120 tons.

Spain. Began the rebuilding of her old navy in 1884 at about the same time as the United States. The latter built more powerful ships however and built faster. So that in the war with the United States the Spanish fleet was badly defeated and more than half of its effective vessels destroyed. The navy was then reorganized and an ambitious building programme proposed. But it was not until 1908 that any vessels of importance were decided upon. In that year the Cortes approved the construction of the following: — 3 dreadnought battleships of 15,000 tons, 3 destroyers of 350 tons, 3 submarines of 300 tons, 24 torpedo boats of 180 tons, 4 gunboats of 800 tons, and 3 fishguard vessels of 157 tons. All these were completed by the end of 1916. A second programme equally large was approved in 1914 but was not undertaken; probably because of the outbreak of the great war. Since 1914, the new construction has consisted of light cruisers, gunboats, destroyers, submarines, and auxiliaries. The present fleet is: — 3 dreadnought battleships of 15,700 tons; 1 old (1887) battleship of 9744 tons; 3 old (1898–1902) armored cruisers of 6889 to 9089 tons; 2 protected cruisers of 5587 and 5778 tons; 1 small cruiser; 800-ton gunboats and many smaller ones; 7 destroyers of 300 to 400 tons; 4 or 5 submarines; 2 torpedo boats and a number of auxiliary vessels. There are under construction 4 light cruisers of 5500 to 6000 tons; 6 submarines (12 more will be built); 3 destroyers of 1145 tons; 2 to 4 torpedo boats (24 will be built). A submarine salvage vessel of 2100 tons, built in Holland, was added to the auxiliaries in 1921. The naval appropriation for 1921–22 is 119,907,672 pesetas (par value of 1 peseta is $0.193), of which 34,000,000 pesetas are allotted to new construction. The act provides for a naval enlisted force of 13,400 men and a marine enlisted force of 4600.

Sweden. Like Norway, Sweden has a large seafaring population; but the latter is larger, more populous and of greater wealth. It is able therefore to support a larger naval force than its sister kingdom. The navy is under the Minister of Defence with the headquarters at Stockholm. The navy department consists of four bureaus, viz.: (a) cabinet of the Minister (b) bureau of *personnel;* (c) naval staff; (d) bureau of material. The school for executive officers (there are no marine engineer officers in the navy) is located at Stockholm; the full course is six years. There are two dockyards, one at Stockholm and one at Karlskrona. The fleet in 1922 consisted of 3 armored coast defense ships of 7605 tons (1918–12), 1 of 4980 tons (1907), 1 of 4658 tons (1907), 5 of 3620 to 3990 tons (1893–1907), 3 of 3715 tons (1890–99), 2 of 3393 tons (1891–94); 4 torpedo gunboats of 800 tons; 4 gunboats of 200 tons; 10 destroyers of 480 to 500 tons; 32 torpedo boats of 92 to 110 tons; 8 submarines of 120 to 235 tons, 10 of 370 tons. There are in reserve but not yet discarded 6 old coast defence ships and 8 or 10 old monitors. The principal auxiliaries are 1 hospital ship, 4 mine layers, 1 repair ship, 1 ice-breaker, 1 submarine depot vessel, and 1 royal yacht. The naval budget for 1921 amounted to 28,752,254 crowns (1 gold crown = $0.268) of which 1,950,000 was allotted for new construction. For 1922, the sum of 15,000,000 crowns is asked for the purpose of constructing submarines.

Turkey. The Turkish navy was wholly destroyed by the great war.

United States. The Naval Appropriation Act for 1921–22 authorized an expenditure of $413,067,039.23 and provided for a naval *personnel* of 106,000 and a marine *personnel* of 21,000. If the agreements of the Conference for the Limitation of Armaments (see VOL. XXIV) are ratified by the various governments, it is likely that the appropriations for 1922–23 will provide for a smaller *personnel* and a greatly reduced allotment for new construction. The effective force of the navy on January 1, 1922, including vessels under construction is shown in the table at the end of this article. Those vessels which are to be scrapped, if the agreements of the Conference on the Limitation of Armaments are ratified by the governments concerned, are separately given in the table. The vessels under construction on April 1, 1922 are listed in the following table, which gives the character, tonnage, and percentage of completion. The vessels which will be scrapped or otherwise disposed of are marked with an asterisk.

VESSEL	Displacement Tons	Per Cent. Complete
BATTLESHIPS:		
Colorado	32,600	90.7
*Washington	32,600	75.9
West Virginia	32,600	78.0
*South Dakota	43,200	38.5
*Indiana	43,200	34.7
*Montana	43,200	27.6
*North Carolina	43,200	36.7
*Iowa	43,200	31.8
*Massachusetts	43,200	11.0
BATTLE CRUISERS:		
*Lexington	43,500	33.8
*Constellation	43,500	22.7
*Saratoga	43,500	35.4
*Ranger	43,500	4.0
*Constitution	43,500	13.4
*United States	43,500	12.1
LIGHT (SCOUT) CRUISERS:		
Omaha	7,500	99.2
Milwaukee	7,500	94.9
Cincinnati	7,500	88.2
Raleigh	7,500	64.9
Detroit	7,500	82.8
Richmond	7,500	89.0
Concord	7,500	85.0
Trenton	7,500	59.0
Marblehead	7,500	47.0
Memphis	7,500	40.0
AUXILIARIES AND GUNBOATS:		
Repairship Medusa	10,000	79.3
Destr. Tender Dobbin	10,600	69.9
Destr. Tender Whitney	10,600	51.8
Subm. Tender Holland	10,600	21.5
Gunboat Tulsa	1,575	72.7
DESTROYERS:		
Trevor	1,215	99.8
Perry	1,215	95.2
Decatur	1,215	86.1

In addition to the foregoing there are 3 fleet submarines and 38 submarines under construction; 6 fleet submarines and 1 submarine are authorized but not yet under construction.

Uruguay. The naval force consists of 1 light cruiser of 1132 tons (1910); 1 old gunboat

of 274 tons and 1 of 380 tons; 2 transports of 260 and 400 tons; and several small steamers.

Venezuela. Has one gunboat of 1125 tons (*ex-Isla de Cuba*); 1 of 571 tons, 1 of 200 tons; 1 armed transport of 568 tons and 1 of 350 tons.

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See *Navy* under the head of FRANCE, GERMANY, ITALY, JAPAN, RUSSIA, UNITED KINGDOM OF GREAT BRITAIN AND IRELAND, and UNITED STATES. Also, ARMOR PLATE; BATTLESHIP; GALLEY; GUNS, NAVAL; NAVAL ACADEMY; NAVAL APPRENTICE; NAVAL COLLEGE OF CANADA; NAVAL SCHOOLS OF INSTRUCTION; SHIP AND SHIPPING; SHIP, ARMORED; SHIPBUILDING; TORPEDO BOAT (includes submarine boats and destroyers); SIGNALS, MARINE; TACTICS, NAVAL; VOLUME XXIV.

NAVIGABLE RIVER. See RIVERS, NAVIGABLE.

NAVIGA'TION (Lat. *navigatio*, a sailing, from *navigare*, to sail, from *navis*, ship + *agere*, to lead). In a broad sense, all means whereby the ship is made to proceed from place to place, but, in a more technical sense, only those means whereby the course of the vessel is directed or ascertained.

HISTORY OF NAVIGATION

The early history of navigation is wrapped in obscurity. The Egyptians had vessels large enough to be called ships about 3000 years B.C. and perhaps long before this. The Chinese also built ships at a very early date. The appliances for navigating these vessels must have been few and rude, and a voyage of a few hundred miles was regarded as a great undertaking. Considering the difficulties under which they labored, the voyages of the Phœnicians must be regarded as daring ventures. They spread their merchant fleets throughout the Mediterranean, navigated Solomon's squadrons to the Persian Gulf and Indian Ocean, and planted colonies everywhere.

Principal among these colonies was Carthage. The Carthaginian fleets passed the Pillars of Hercules and, with no better guide than the stars, are believed to have sailed northward to the British Isles and southward for some distance along the west coast of Africa. In 611 B.C. a Phœnician expedition fitted out by Pharaoh Necho started to circumnavigate Africa, a feat which is said to have been actually accomplished. From the eighth to the fourth century B.C. the Greek states gradually developed the art of navigation, and at the time of the Peloponnesian War the Athenians appear to have been skillful tacticians, capable of concerted manœuvres. In the fourth century B.C. Alexander the Great destroyed the power of Tyre, transferring its commerce to Alexandria, which became the centre of trade for the ancient world. Rome wrested from Carthage its naval power and diverted its vast trade to the Italian sailors.

During all this period the average size of the vessels had been continually increasing. For propelling war vessels and boats in the coasting trade, oars were chiefly used, though nearly all vessels possessed sails; but for long commercial voyages, sails were necessarily the main reliance, and some knowledge was early possessed of beating to windward against adverse breezes. Speed, however, was not ordinarily attained, as a voyage from the Levant to Italy or Carthage was often the work of a season. During the time of the Roman Empire no great progress seems to have been made except in the size of the vessels, but regular fleets were maintained, both in the Mediterranean and on the Atlantic coast of Gaul, for the protection of commerce.

The barbarian nations of the North developed the art of navigation in their own way. The Saxons, Jutes, Danes, and Norsemen began to roam the ocean in every direction; in small vessels they trusted more to the winds than to oars and, sailing singly, gradually acquired that hardihood and daring which ultimately rendered them masters of the sea. The Danes and Norsemen extended their voyages to Iceland, Greenland, and Newfoundland, while they first ravaged and then colonized the coasts of Britain, France, and Sicily.

In the Middle Ages the Venetians, the Genoese, and the Pisans became the carriers of the Mediterranean Sea. Their merchants traded to the farthest Indies, and their markets became the exchanges for the produce of the world. Their constant rivalries gave occasion for the growth of naval tactics. So rich a commerce tempted piracy, and the Mohammedan corsairs spread over the Mediterranean and, passing through the Straits of Gibraltar, ravaged the Atlantic coast.

The mariner's compass (q.v.) came into quite general use in the thirteenth century and rendered the seaman independent of the sun and stars, so far as simple steering was concerned. The variation of the compass from true north seems to have been observed as early as 1269, but it was not until the voyages of Columbus that much attention was paid to it.

The works of Claudius Ptolemy (q.v.), although forgotten in Europe, were known to the Eastern world and were held in high estimation by the Mohammedan scientists and philosophers. As the Arabs, Saracens, and Moors possessed

charts of much value, it is possible that they were based upon Ptolemy's maps or improved by a knowledge of them. Very early in the Middle Ages, perhaps before 1000 A.D., small books of sailing directions (called portolani or pilots) were compiled, and one or more charts included in them. These charts were covered with lines radiating from important seaports, or from other points on land or in the water, and showed the direction of different points from each other. On board ship the courses were at first ascertained from the sun, moon, and stars, but the introduction of the compass caused the portolani charts to be much improved and further developed. One of the oldest existing charts of this kind is the so-called Pisan chart, which belongs probably to the middle of the thirteenth century; it covers the whole of the Mediterranean. The earliest portolani chart of which the exact date is known appears to be that of Pietro Vesconte (1311). These charts are all plane and are chiefly of the Mediterranean, though some which appeared in the fourteenth century show the Azores, the Canaries, and the coast of Africa as far as Cape Bojador.

The translation and dissemination of Ptolemy's works in the fifteenth century caused a great improvement in maps and charts, and the subsequent labors of Mercator (q.v.) and others brought them to a very satisfactory state, considering the lack of exact geographical information. Mercator's projection was a great advance in navigation, for it enabled a ship's course (by compass) to be laid down as a straight line on the chart. Edward Wright, who published in 1599 a work entitled *Certain Errors in Navigation Detected and Corrected*, gives a complete exposition of the proper method of constructing a Mercator's projection (see MAP), together with other information of value.

In the early days of seagoing, vessels followed the coast in good weather and kept away from it in bad. The only navigating instruments were the sounding pole or a weight at the end of a line (see SOUND, SOUNDING), and the moderate depths which could be measured by these means caused the depth of the sea to be greatly exaggerated in the popular mind. After a time some form of sundial was used for steering courses in the daytime, and the coast was not followed so closely. At night a star, especially the polestar, was used when possible. Deep-sea navigation made a great advance in the fifteenth century through the work and assistance of Prince Henry of Portugal (called the Navigator), whose voyages and investigations were carried on between 1415 and 1460. He improved the existing charts, began the development of navigation as a science, and the encouragement he extended caused the invention of many nautical instruments and the compilation of numerous nautical tables.

Means of measuring the altitude of heavenly bodies are very old, but they were not much used at sea until after voyages beyond the limits of the Mediterranean became common. The first practicable instrument for sea observation was the cross-staff. The date of its invention is unknown. It is described in the first edition (1496) of the *Margarita Philosophica*, but it was then an old instrument of which the use by seamen was beginning to be common. Columbus is said to have used a cross-staff on his first voyage. It was employed for the determination of latitude and, after the preparation of suitable tables, for the determination of longitude by measuring the distance between a fixed star and the moon. The astrolabe (q.v.), a more cumbersome instrument, was adapted to nautical uses by suspending it from a small ring, and it became widely used by mariners. Díaz, Vasco da Gama, and Columbus are said to have used it. From the cross-staff and astrolabe were developed the forestaff, backstaff, double quadrant, and sextant (q.v.).

In 1530 Gemma Frisius, of Louvain, suggested the use of watches, in conjunction with instrumental observation, for the determination of longitude; but the lack of good timekeepers greatly hampered the method. The importance of improving them was more and more appreciated as time went on, but it was not until 1765 that Harrison was awarded £10,000 by the British government for his improvement (temperature compensation) of the chronometer. This was found to be so satisfactory that a second award of £10,000 was made to him.

According to Pedro Núñez the captains and navigators of Prince Henry the Navigator were well instructed in mathematics, geometry, and the care of instruments. It is therefore probable that the astronomers and scientists employed as instructors by the Prince prepared works upon navigation, but none are known to exist. In 1530 Gemma Frisius wrote upon astronomy, cosmogony, and the use of the globes. In 1537 Pedro Núñez (Nonius), cosmographer to the King of Portugal, published a work which discussed various problems in astronomy, charts, and in certain fields of navigation. But the earliest treatise devoted specially to navigation was that of Pedro de Medina, published at Valladolid in 1545. This was followed in 1556 by *The Art of Navigation* by Martín Cortés, published at Seville. In 1593 John Davis published *The Seaman's Secrets*, in which he described traverse and great-circle sailings. Early in the seventeenth century arithmetical calculation of navigational problems replaced instrumental solution. About 1620 trigonometry was applied to navigation, and this was closely followed by logarithmic tables. During the next hundred years timekeepers were greatly improved, and navigation tables and formulas considerably improved and extended. The invention of the sextant (q.v.) in 1731 and Harrison's chronometer in 1765 gave to observations an approximation to exactitude they had not previously possessed.

Among the developments of the nineteenth century were the Thomson dry compass, the Ritchie liquid compass, the patent log, compensation for deviation of the magnetic compass, the great-circle chart, Sumner's line of position, improvements in charts, navigation and astronomical tables, and in methods of computation, and a vastly improved knowledge of storms, which has taught how to avoid them when possible and to minimize their danger when avoidance is impossible. The great improvement of the twentieth century is the gyroscopic compass. (See COMPASS.) Steam and other forms of power propulsion have added much to the ease and safety of navigation, while the increased number of vessels has detracted something from the safety. The most serious enemies of the navigator of the present day are fogs and irregular currents.

MODERN ART OF NAVIGATION

In the merchant service vessels are in charge of a pilot when going in or out of port. Naval

vessels take pilots only under special circumstances which require the local knowledge of a pilot. Upon getting under way leadsmen are stationed ready to take soundings. The ship is kept in the channel by observing beacons, buoys, landmarks, ranges, lighthouses, etc. If the water is shoal, soundings are taken at regular intervals. For convenience in navigating certain channels at night lighthouses and lighted beacons or buoys are placed in suitable locations. In some channels ranges are established, i.e., two objects (at night two lights) are located on a prolongation of the axis of the channel so that by steering in a manner to keep them in line the ship is kept in deep water.

Upon reaching the open sea the pilot (if one is taken) is discharged. The position of the vessel is then ascertained by compass bearings or other means, and the place so determined is the point of departure. The course is then laid for the next port or for a point on the most available route.

The further navigation of the vessel is effected by means of: (*a*) compass bearings, or horizontal angles, if proceeding along the coast and the land is in plain sight; (*b*) observations of the heavenly bodies; (*c*) dead reckoning; (*d*) soundings (see SOUND, SOUNDING) so long as the depth is less than 100 fathoms. Dead reckoning is used when land is not in sight and when the sky is so covered with clouds as to make astronomical observations impossible; also to compute the short distances between observations. (See SAILINGS.) To determine the ship's exact position by soundings alone is always difficult and at times impossible, but they usually suffice to keep the vessel out of danger. By taking a large number of soundings and spacing them at the proper intervals on the edge of a slip of paper, a close approximation to the position may be obtained by moving the slip until all soundings on it agree closely with corresponding ones on the chart.

When sailing along a coast, the exact position of the ship may be found by reference to any objects on shore which can be identified and are marked on the chart. If three objects can be seen and the angles between them are over 30°, these are measured, and the position determined by a three-armed protractor or station pointer. If only two are visible, compass bearings of both, if laid down on the chart, determine the position by their intersection; or one bearing and the angle between the two may be taken. With one object, bearings at different times must be taken, and the distance run by log between the times of observation noted. Lines parallel to the course are then drawn across the bearing lines on the chart. The one on which the intercepted distance is correct is that on which the ship has sailed. Its intersections with the bearing lines are the positions of the ship at the times of observation. A very common practice is to note the time and reading of the patent log when an object bears 45° forward of the beam and when abeam. The distance run between the observations is the distance of the ship from the object when it is abeam.

When out of sight of land, positions are determined by observations of heavenly bodies. The sun is more useful, but the moon, planets, and stars are observed when the horizon can be clearly seen. The latitude is most accurately determined when the body is on the meridian (i.e., bears north or south), and the longitude when it bears east or west. The altitude of a heavenly body above the horizon is measured by means of a sextant. In the case of the sun the observed altitude must be corrected for semidiameter (to get the altitude of the sun's centre), for parallax (to reduce the observation to the centre of the earth), for refraction (to allow for bending of the light ray), and for dip of the horizon (to get the correct angle above a horizontal plane). In the case of a star or planet parallax and semidiameter are inappreciable. See LATITUDE AND LONGITUDE.

Observations for Latitude. The simplest method of obtaining the latitude is by observing the meridian altitude. In Fig. 1 $OP'QPM$ is a section of the earth through the plane of the meridian of M, the point of observation; PCP' is the polar axis; OCQ is the plane of the equa-

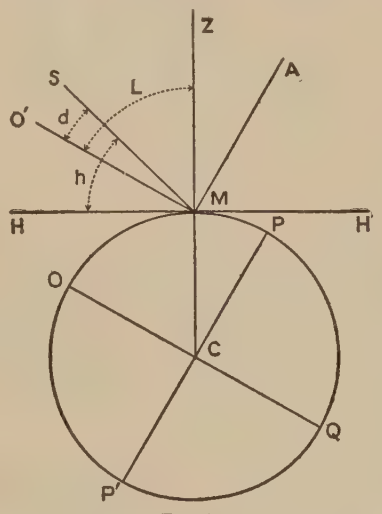

FIG. 1.

tor; S is the object observed; HH' is the plane of the horizon; $O'M$ is parallel to OCQ; Z is the zenith; AM is parallel to PCP'. Then the angle SMH $(= h)$ is the altitude of the body; SMO' $(= d)$ is its declination from the equator; $O'MZ$ $(= L = OCM)$ is the latitude of M; and $ZMH = 90°$; therefore $L = OCM = O'MZ = 90° - (h \mp d) = 90° - h + d$.

Therefore, if we add the declination (taken from the table in the *Nautical Almanac*) of the body to 90° and subtract the corrected altitude from the sum, we get the correct latitude. To make sure that the altitude used is the meridian altitude, the observer begins to measure it a little before noon. It increases steadily to a maximum and then decreases. As soon as the decrease begins the maximum is known to be the meridian altitude. If cloudy about noon and there is danger of not getting the meridian altitude, the times of the other altitudes are observed. The one nearest to apparent noon is taken, and this may be corrected from the tables so as to give the proper meridian altitude. If no altitude within 13 minutes of noon can be obtained, a spherical triangle must be solved, the method being somewhat similar to that used in determining longitude.

Observations for Longitude. The longitude of a place is its angular distance from the prime meridian. In most countries Greenwich is taken as the prime meridian for various reasons. Since

the difference in time (expressed in hours) between two places is one-fifteenth the difference in longitude (expressed in degrees), if we know the local time and the Greenwich time, we can get the longitude of the place of observation. Greenwich time is obtained from the chronometer. It may not show the exact Greenwich time, but its error and rate of gain or loss are known, having been determined in port or by the wireless time signals that are sent out daily. Any heavenly body may be used for longitude observations. In Fig. 2 the projection is made on the plane of the horizon of the place of observation, O; P is the nearest pole; S is the sun or other body; WQE is the equator; $SH = h$ is the altitude; $SD = d$ is the declination from the equator; t is the hour angle from the meridian; $PS = p$ is the polar distance, and $p = PS = PD - SD = 90° - d$; OS is the zenith distance, and $OS = OH - SH = 90° - h$; OQ is the latitude of O, and $OP = PQ - OQ = 90° - L$. By trigonometry we have

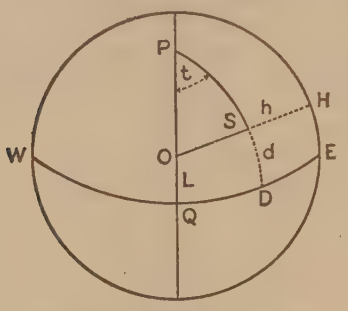

Fig. 2.

$$\sin^2 \tfrac{1}{2}t = \sec L \operatorname{cosec} p \cos s \sin (s - h),$$

in which $s = \tfrac{1}{2}(h + p + L)$.

If the sun is west of the meridian, t is the local apparent time; if east of the meridian, the local apparent time is 12 hours minus t. To the local apparent time apply the equation of time (q.v.), and the result is the local mean time. The difference between this and the Greenwich mean time (derived from the chronometer) gives the longitude in time; multiplying by 15 gives the longitude in arc. If the moon, a planet, or a star is used for observation, t is the hour angle of the body from the meridian. Add to this the right ascension (from the *Nautical Almanac*) to get the local sidereal time and apply the reduction (from the *Nautical Almanac*) to obtain the local mean time. Then proceed as before.

Sumner's Method. When a heavenly body is in the zenith, its altitude is 90°. At points 10° away in all directions the altitude is 80°. Such points are located on a circle with the zenithal point as a centre. So for any given altitude h of a heavenly body there is a circle on the earth at all points of which the altitude is h. If the equation which has been given for the determination of time (and longitude) is solved with two different values of the latitude (L), it will give two points on the circle corresponding to the observed altitude. Since this circle is large (provided the altitude is not near 90°), if the difference in latitude of the two points is 30 miles or less, a line joining them practically forms part of the circle. When the correct latitude is obtained, the point of this line which has the true latitude is the correct position in both latitude and longitude. If two heavenly bodies are observed which bear 30° or more from each other, two Sumner lines are obtained, and their intersection is the correct position. If practicable, the two bodies should bear at right angles from each other in order to reduce the probable error.

Saint-Hilaire Method. In this the position of the ship is estimated and the corresponding altitude computed. The altitude and azimuth of the sun are obtained by observation. The two altitudes are compared, and the assumed position is moved the distance, in the direction of the azimuth, corresponding to the error of the altitude at the assumed position. If a Sumner's line is desired, it is drawn through the corrected position perpendicular to the direction of the sun's bearing.

Laying the Course. In laying the course the navigator must take into consideration the ocean currents, prevailing winds, rocks, shoals, fog, storms, etc. The ocean pilot charts (see Pilot Chart) show the currents, probable direction and force of winds, areas of probable fog, areas in which icebergs may be expected, the most practicable routes for vessels to follow between certain ports or when crossing certain seas or oceans, and the tracks of the cyclonic storms. Further information is obtained from books called *Ocean Pilots* or *Sailing Directions*. Areas of probable ice and fog should be avoided as far as practicable, and the course should be laid to avoid heavy winds and cyclonic storms. This is not always possible, but the study and investigation of these storms (see Meteorology, *Marine Meteorology*) made in the last 75 years have led to the discovery of means of escaping their most serious dangers or of greatly reducing them.

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Much information in regard to navigation is contained in the following articles: Almanac; Astronomy; Collisions of Vessels; Compass; Dead Reckoning; Fog Signals; Helm; Latitude and Longitude; Lead, Sounding; Log; Log Book; Meteorology; Rules of the Road; Safety at Sea; Sailings; Seamanship; Sextant; Sound, Sounding; Steering; Storm; Tacking and Wearing.

NAVIGATION, Aërial, Law of. The law governing the use of the air spaces by persons operating balloons and other air craft, and the rights and obligations of such persons with respect to the soil or territory over which they operate. The law of the airship comprehends, therefore, questions of public as well as of private right and rules of municipal or domestic as well as of international law. When aërial navigation was still in its infancy, it had already produced a considerable legal literature.

This was, in the absence of concrete cases, largely abstract and speculative in character, dealing not so much with the actual rights of user of air space and actual liability for injuries sustained as with the principles on which the law of the subject might be expected to develop in the future. Thus, in the field of public law the right of a state to exercise sovereignty in the air space over the national territory was unquestioned; but whether this sovereignty was based on actual ownership of the air space, whether it was unlimited in extent or restricted to a definite or indefinite zone, whether, if restricted, it was limited to a fixed altitude or to the range of a cannon shot, whether it was absolute or subject to an easement of use by foreign aviators—these were questions much debated and as to which no agreement was reached.

The same differences of opinion developed with regard to the rights of owners of the land underlying the air space in private law. It was conceded that such a proprietor owns the air space above his land, but whether, according to the maxim of the Roman and the common law, he owned all the way up, *usque ad cœlum*, or only so far as was necessary to protect him in his use and enjoyment of the surface of his land, was still in dispute. Even in our legal system it was, to say the least, doubtful whether a person flying a kite or operating an aëroplane at a considerable height above my land would be held liable in trespass, though he would certainly be liable as for a nuisance for any injury to my house or trees or garden resulting from his acts. So far as this branch of aërial law was concerned, the following points might be considered settled:

1. The aviator is liable in trespass for landing, whether negligently or by design, on my land.

2. In such a case he is liable not only for the damages directly caused by his trespass, but also for those indirectly resulting therefrom, as through the gathering of a crowd attracted by his descent.

3. He is liable in trespass for sailing close to the ground or to the buildings thereon.

4. He is liable in trespass if he throws anything, such as sandbags, bottles, or other articles, on the land.

5. Apart from any trespass on land he is liable for any injury resulting from his negligence to any one.

6. He is probably liable in England and the United States for any injury caused by him, even though not due to negligence on his part—this because of the danger to the general public which the practice of aviation involves. Several of the European codes have laid down the rule that injury done without fault results in no liability, but the contrary rule was laid down in the draft code prepared by the American Bar Association (1910). This bill (not enacted into law in 1915) also provided for the licensing of air men by the state. No rules having been adopted governing collisions, salvage, etc., in connection with aviation, it was, therefore, a matter of conjecture whether the maritime law or the law governing vehicles on land, which differ on these points, would be applied to air craft. Whether a crime or a tort committed on board an airship was punishable in the state over whose territory the wrong was done or by the state in which the craft was owned was also a question for future determination.

International law has dealt with several aspects of aviation, especially (1) with the status of the aviator scouting or carrying dispatches in time of war; (2) with the discharge of projectiles and explosives from balloons and aëroplanes; and (3) with the question whether the airship of a belligerent may lawfully cross the territory of a neutral power.

As to the first point, it was contended by Bismarck in the Franco-German War in 1870 that balloonists of the enemy who crossed the German lines should be executed as spies. As a matter of fact, however, captured balloonists were treated by the Germans as well as by the French as prisoners of war, and this practice has been adopted as the rule in all cases where the aviator has not acted clandestinely or on false pretenses. (Hague Conference of 1899, Second Convention, Art. 29.)

As to the second point, a determined effort made by several of the Powers, notably by Belgium and Great Britain, wholly to prevent the use of airships as engines of destruction in time of war was defeated by Germany, France, and others of the Great Powers. A convention prohibiting "the discharge of projectiles and explosives from balloons or by other new methods of a similar nature" was adopted by the First Hague Conference (1899) for a term of five years and was renewed by the Second Conference (1907), but as all the great military Powers, with the exception of Great Britain and Austria-Hungary, refused to sign it, it became a dead letter. However, a more restricted proposal of the First Conference forbidding the bombardment of undefended places was adopted by the Second Conference and extended so as to include aërial operations as follows: "The attack or bombardment *by whatever means* of towns, villages, habitations, or buildings which are undefended is prohibited." (Regulations Respecting the Laws and Customs of War on Land, Art. 25.) This convention was ratified by all the Powers and was, therefore, in full force during the European War of 1914. As expressed it lent itself to evasion. There was a question as to the meaning of the term "undefended." It might mean a town or other place unfortified in the old sense of the term, or it might mean a place undefended in any way, even by a gun or guns intended only as a defense against hostile air craft; and in either case it left room for doubt whether an undefended private residence or church in a fortified town was covered by the terms of the convention. On any construction, however, the provision was repeatedly violated in the course of the war; wholly undefended towns and places, as well as private dwellings, railroad stations, and the like in cities like Paris and London, which were in the technical sense fortified, have suffered from aërial bombardment.

As to the third point, it seems to be conceded that for a belligerent airship to use the air space of a neutral state for purposes connected with the conduct of a war was a violation of the neutrality of such state. On the other hand there is no basis for the claim that such use of neutral territory for purposes of observation made before the outbreak of hostilities is a violation of neutrality.

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NAVIGATION, FREEDOM OF. The right which all nations possess of unrestricted passage over the high seas. While the right is now universally admitted, it is only within the past century that the question has become a settled one. Formerly claims of territorial jurisdiction were made over large portions of the ocean, and these claims have led to much controversy and frequent international disputes. But the question of national control in its present phase is reduced to the application of the rule to broad arms or recesses of the sea, narrow seas inclosed within the territory of a single state, straits leading to inland seas, such inland seas and navigable rivers rising in one country and discharging through the territory of another.

Of the first class bays are generally conceded to belong to the states to which the embracing promontories belong, unless the headlands are so far separated as not to permit of effective defense. Thus, Delaware Bay was in 1792 declared to belong exclusively to the United States, and a like claim for Chesapeake Bay would hardly be contested, although the Bay of Fundy is held to be a part of the high seas.

The straits over which international controversy has chiefly arisen are those leading into the Baltic and Black seas. Denmark claimed exclusive control over the former by prescriptive right. As early as 1319 certain prescribed tolls were levied upon the Dutch, an attempt to increase which a century afterward resulted in war. In the seventeenth century England and France contracted to pay the same Sound dues that the Dutch paid. This continued until about 1855, when an arrangement was made whereby Denmark relinquished her claim to tolls and agreed to police properly and protect the passage. Previous to Russia's acquisition of the northern coast of the Black Sea it was Turkish water, but by the Treaty of Adrianople (1829) entrance through the straits into the Black Sea and navigation thereon were permitted to Russia and Powers friendly to her. But according to the ancient custom all foreign vessels of war had been prohibited from entering the Bosporus and the Dardanelles, and this inhibition was continued under the Treaty of London (1841) between Turkey and the five Powers. By the Treaty of Paris of 1856 the Black Sea was neutralized, but in 1871 Russia secured the abrogation of this provision of the treaty and has the right of maintaining her fleets of whatever size in the Black Sea. Turkey might in time of peace lawfully open the straits to her friends, although unfriendly to Russia, whenever it might seem necessary to provide for her own safety.

When a navigable river runs between two states, both are guaranteed its unmolested use, and the line of jurisdiction is held to run along the middle of the stream. But when a river rises in the territory of one state and discharges through the territory of another, international law does not admit the moral claim sometimes asserted by the upper state to right of navigation to the mouth. Yet nearly all such streams flowing through the territory of Christian nations have now beeen opened by international agreement. By the act of the Congress of Vienna (1815) declaring free the use of certain streams separating or traversing the territory of different Powers, the Rhine and Scheldt were opened to navigation. This act also opened most of the other European rivers, excepting the Danube, which by the Treaty of Bucharest and later by that of Adrianople (1829) was made free for common commercial use to Turkey and Russia. Later by the Treaty of Paris (1856) this also came within the application of the concert of the Congress of Vienna. At the close of the Revolutionary War Spain held the territory at the mouth of the Mississippi and refused the United States outlet to the Gulf of Mexico. The Louisiana Territory was subsequently ceded to France, and its purchase by the United States in 1803 disposed of the question. The St. Lawrence was thrown open to the United States by the reciprocity Treaty of 1854 with Great Britain, which also included the reciprocal use of the Upper Lakes and the freedom of Lake Michigan to Canadian subjects. In South America the freedom of the Río de la Plata to commerce was guaranteed by a series of treaties from 1853 to 1859, while the Amazon was in 1867 declared by Brazil to be open to all nations. The Stikine, Yukon, and Porcupine rivers of Alaska, rising in British territory, were opened to the subjects of England and the United States by the Treaty of Washington (1871), while the Congo and Niger in Africa were opened under an agreement for an international commission provided for by the Congo Conference of 1884–85. Consult the authorities referred to under INTERNATIONAL LAW. See also HIGH SEAS; MARE CLAUSUM.

NAVIGATION ACT. The name applied to each of a series of acts, known collectively as the Navigation Acts, passed by the English Parliament, beginning with 1645, for the purpose of protecting the shipping of Great Britain and her colonies, of injuring the shipping of the Dutch, the chief rivals of the English, and of exploiting, for the benefit of England, the commerce of the English colonies. See NAVIGATION LAWS.

NAVIGATION LAWS. The early restriction placed upon commerce was but one phase of the application of the economic doctrines advocated prior to the time of Adam Smith, prohibiting exports, regulating intercourse, and generally obstructing the operation of economic laws. The first recorded British navigation law belongs to the reign of Richard II (1381) and required the shipment of merchandise by the "King's liege people" in "ships of the King's liegance." Subsequently a more liberal policy was pursued. With the discovery of the New World and the consequent growth of colonial dependencies, both the importance of navigation laws as a question of policy and their sphere of influence were greatly extended. England, France, Spain, Portugal, and Holland by their restrictions prohibited all commercial intercourse between their colonies and other nations, and Spain even treated the crews of foreign ships wrecked upon her coasts as pirates. In 1645 the

English Parliament passed an Act prohibiting the importation into England of whale oil and other products of the whale fisheries in any vessels except such as were owned in England and were manned by English seamen. This Act was the first of a long series of Acts which are known collectively in history as the Navigation Acts. The Acts of 1651 and 1660—the latter of which is known officially as the First Navigation Act—served as the basis of the British legislation in this field for almost 200 years. In general, the objects of these Acts, as of the succeeding ones, were to protect the shipping of England and her colonies and to exploit the trade of the colonies in the interest of the mother country. The chief feature of the Acts of 1651 and 1660 was the prohibition of the importation into England of foreign products except in English ships or in the ships of the country of production. In 1663, by what is usually known as the Second Navigation Act, it was ordered that "none of the products of the English plantations or factories . . . in Asia, Africa, or America shall be carried anywhere (except to other plantations) till they be first landed in England, under the forfeiture of ships and cargoes." The English restrictive measures neither destroyed the Dutch commerce of the seventeenth century nor stamped out American shipping interests of the eighteenth. The chief features of the British Navigation Code, which was essentially identical with that of all maritime nations as it existed down to the time of its repeal in 1849, required: That no foreigner could own, wholly or in part, an English ship; the captain and three-fourths of the crew must be British subjects; foreign products must be imported in British ships or in ships of the country of production; products of Asia, Africa, and America could not be imported into Great Britain from any European port in any ship whatsoever, and such products could be imported from any other place only in British ships or those of the country of production. No coastwise trade was permitted in foreign ships to the United Kingdom or between different British possessions, and trade of any kind was permitted only by special authorization. The effort to evade these restrictions involved great waste of capital, while the adoption of a more liberal policy has resulted in a steady enlargement of the prosperity of the British merchant marine.

For the navigation laws of the United States, see MERCHANT MARINE OF THE UNITED STATES.

NAVIGATOR, HENRY THE. See HENRY THE NAVIGATOR.

NAVIGATORS ISLANDS. See SAMOAN ISLANDS.

NAVILLE, nȧ'vêl', EDOUARD HENRI (1844–). A Swiss Egyptologist, born at Geneva, June 14, 1844, and educated at Geneva University, King's College, London (1862), Bonn (1866), and the Faculté des Lettres, Paris, receiving his degree in 1867. During this period, having paid much attention to Egyptology, in 1868 he followed the courses of Lepsius at Berlin, in the following year went to Egypt, and in 1870 published as the result of his investigations there *Textes relatifs au mythe d'Horus recueillis dans le temple d'Edfou.* His *La litanie du soleil* appeared in 1875 and his *Inscription historique de Pinodjem III* in 1883. Commissioned in 1874 by the London Congress of Orientalists to edit the text of the Egyptian *Book of the Dead* (q.v.), Naville spent the next 10 years collecting material in the libraries and museums of Europe. The results of his labors appeared in *Das ägyptische Todtenbuch der 18. bis 20. Dynastie* (1886), one of the most important works in the history of Egyptology. Beginning in 1882, Naville usually spent his winters in Egypt conducting fruitful investigations for the Egyptian Exploration Fund. In 1891 he became professor of Egyptology in the University of Geneva. Among the most important of his works, besides those already mentioned, are: *The Store City of Pithom and the Route of the Exodus,* Egyptian Exploration Fund Memoir, i (1885); *Goshen and the Shrine of Saft el Henneh,* ib., iv (1887); *The Festival Hall of Osorkou II,* ib., x (1892); *Ahnas el Medineh,* ib., xi (1894); *Deir el Bahari,* ib., xii–xiv, xvi, xix (1894–1901); *Les amis de la paix dans l'Afrique du Sud* (1901); *La religion des anciens Egyptiens* (1906; Eng. trans., *The Old Egyptian Faith,* 1909); *Papyrus funéraires de la XXIe dynastie* (1912).

NAVRÁTIL, nȧv'rä-tĭl, CARL (1867–). A Bohemian composer, born at Prague. He studied under Guido Adler and Ondricĕk. His compositions include: two operas, *Hermann* and *Salammbô;* five symphonic poems, *John Hus, Ziska, Zalov, Neklan,* and *Der weisse Berg; String Quartet in D Minor; Symphony in G Minor; Mass in D;* two trios and two quintets for piano and strings; a sonata for violin and piano and one for viola and piano; and much pianoforte music and many songs.

NAVY. See NAVIES.

NAVY, DEPARTMENT OF THE. One of the ten executive departments of the United States government, created by Act of Congress of April 30, 1798, and charged with the general control and administration of the navy. From 1789 to 1798 the management of naval affairs was under the control of the War Department. At the head of the department is a secretary, who is a member of the cabinet, appointed by the President with the advice and consent of the Senate, and receives an annual salary of $12,000. As the President is by the Constitution the commander in chief of the navy, the Secretary is generally subject to his direction. It is his duty to execute such orders as the President may give relative to the administration of naval affairs, including the procurement of naval supplies and the construction, armament, equipment, and employment of vessels of war. A variety of specific duties are imposed upon him by law, in which cases he is not subject to the direction of the President. He makes an annual report to the President of the operations of the Navy Department. His deputy is the Assistant Secretary, who is appointed by the President, and who during the absence or incapacitation of the Secretary acts in his stead, taking the title of acting Secretary. An Act of June 8, 1880, authorized the appointment of a judge-advocate-general of the navy from the marine corps or the navy with the rank of colonel or captain. It is his duty to receive, revise, and record the proceedings of courts-martial, courts of inquiry, boards for the examination of officers for retirement and promotion in the naval service, and to give opinions on such legal questions as arise in the course of the administration of the navy. Another officer of importance attached to the Navy Department is the commandant of the marine corps.

By an Act of July 5, 1862, eight bureaus were established in the Navy Department, at

the head of each being a chief, appointed by the President from among the officers of the navy. These are the bureaus of (1) Yards and Docks; (2) Equipment; (3) Navigation; (4) Ordnance; (5) Construction and Repair; (6) Steam Engineering; (7) Medicine and Surgery; and (8) Supplies and Accounts. See *Navy*, under UNITED STATES.

NAVY LEAGUE OF THE UNITED STATES. An organization incorporated in 1903 whose object is "to acquire and spread before the citizens of the United States through branch organizations and otherwise information as to the condition of the naval affairs and equipment and to awaken public interest and coöperation in all matters tending to aid, improve, and develop their efficiency." The league is strictly nonpartisan, and men, women, and children are eligible to membership. Its badge is a button of silver gilt and blue enamel, with letters in white and an anchor of gold. The membership in 1915 was about 10,000. The president in that year was Gen. Horace Porter. The league's headquarters are in Washington.

NAVY REGISTER. An annual official publication of the United States Navy Department. It gives a list of the officers of the navy and marine corps in order of their rank, a list of retired officers, a statement of resignations, retirements, dismissals, and deaths since the publication of the previous register, the number of stations with the ships on each and the names of officers attached to them, and an enumeration of the ships of the navy, with some details of their character, present condition, and service. Similar lists are issued for other navies. As a rule they contain less information than the United States register. The British navy list is issued monthly.

NAVY YARD. A navy yard is a government establishment for the construction, repair, and equipment of vessels of the navy. The yards at New York, Norfolk, and San Francisco are equipped for the building of large vessels, and the one at Philadelphia in 1915 was being fitted for such work. One of the most important features of a navy yard are the dry docks, because steel vessels must have their bottoms scraped and painted every six months—not for preservation, but in order to keep up their speed and avoid the useless waste of coal entailed by a foul bottom covered with barnacles and seaweed. The commanding officer of a navy yard is called the commandant and is a naval officer of high rank. The manufacturing and repair department is under control of the manager (an officer of the rank of commander or captain). It consists of the hull division and the machinery division, each with its own head. The other departments of the yard are the general storekeeper's department, yards and docks department, accounting department, pay department, and medical department. The general storekeeper purchases and supplies all the material for yard use and for vessels at the yard, including provisions and clothing for the crews. The head of the yards and docks department is responsible for the care of buildings, wharves, streets, and other public works in the yard. The character of the work in the other departments is indicated by their titles. The principal navy yard of the United States is located at Brooklyn, N. Y., on the East River. There are four dry docks at this yard. Here also is located the naval-clothing factory which makes the uniforms for the enlisted men. The other important navy yards of the United States are at Norfolk (Va.), League Island (near Philadelphia), Boston, Mare Island (San Francisco Bay), and Bremerton (Puget Sound); there are less important yards at Portsmouth (N. H.), Pensacola (Fla.), and New Orleans, and a yard of considerable importance is being developed at Charleston, S. C. In England the term "dockyard" (see DOCKYARDS, ROYAL) is equivalent to the American designation "navy yard." The great naval establishments on the continent of Europe are generally termed "arsenals." See ARSENAL.

NAWA, nä'wȧ, or **NABA.** A seaport on the west coast of the island of Okinawa, in the Luchu group, Japan (Map: Japan, G 7). It is the principal seaport of the group and exports sugar, cotton, and silk to Japan. Pop., 1903, 43,132; 1908, 47,562.

NAWANAGAR, *na*-wä'nŭg'*ar*. A seaport of India. See NOWANAGAR.

NAX'OS (Lat., from Gk. *Náxos*). The largest, most beautiful, and most fertile of the Cyclades (q.v.), known in ancient times also as Dia or Strongyle (Map: Greece, G 6). It lies in the Ægean, midway between the coasts of Greece and Asia Minor. Extreme length, about 20 miles; breadth, 15 miles; area, 163 square miles. Pop., 1909, according to Baedeker, 18,603. The principal products and articles of export are wine, corn, oil, cotton, fruits, and emery. The wine of Naxos (the best variety of which is still called in the islands of the Ægean Bacchus wine) was famous in ancient as it is in modern times, and on this account the island was celebrated in the legends of Dionysus and Ariadne. The island also contains good quarries of marble of a rather coarser grain than that of Paros. They were worked in the sixth century B.C., as is proved by the unfinished statues found in them, among which is a famous colossus some 34 feet in length. The most flourishing period in the history of the island seems to have been in the sixth century B.C. under the rule of the tyrant Lygdamis. In 490 B.C. it was ravaged by Persians and later joined the Delian League, from which (469 B.C.) it was the first to revolt. The island now became a dependency of Athens. After the conquest of Constantinople by the Latins, it became in 1207 the seat of a dukedom, founded by the Venetians, and in 1579 was seized by the Turks. It now forms a portion of the Kingdom of Greece (q.v.). Naxos, the capital, with a population of 1760 in 1909, is situated on the northwest coast, contains Greek and Catholic churches and a castle built by the Venetians, and is the seat of a Greek and a Latin bishop. Consult: Ludwig Ross, *Reisen auf den Inseln des aegäischen Meeres*, vol. i (Halle, 1840); E. Curtius, *Naxos* (Berlin, 1846); Ernest Dugit, *De Insula Naxo* (Paris, 1867); H. F. Tozer, *Islands of the Ægean* (Oxford, 1890); K. Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909).

NAYARS. See NAIRS.

NAY'LER, JAMES (c.1617–60). An English Quaker. He was born at Ardsley in Yorkshire. In 1642 he became an adherent of the Parliament and served for about eight years under Fairfax and Lambert. While in the army he began to preach as an independent, but in 1651 was led by George Fox to become a Quaker, and for three years was Fox's literary coadjutor. But popularity turned his head. His followers

fancied that he resembled the pictures of Christ, and they called him Jesus and the Lamb of God, in spite of the protest of Fox and the leading Quakers. After riding into Bristol accompanied by a few followers, in imitation of Christ's entry into Jerusalem, he was arrested on charges of blasphemy, tried before Parliament, and sentenced to the pillory, whipping, branding, and imprisonment for two years. The whole punishment was inflicted. He was released in 1659, recanted his errors, and was again received by the Society of Quakers. A collection of his writings was published in London in 1716, and his *Memoirs* in 1719 and reprinted in 1800. He is mentioned in George Fox's *Journals*. Consult also Sewel, *History of the Quakers* (1725, often reprinted; New York, 1844).

NAZARÆANS, năz'â-rē'anz, **NAZORÆANS**, or **NAZARENES**, năz'â-rēnz'. A designation of Christians as Galileans. In the Talmud Jesus is called *ha-nozri* and his followers *ha-nozrim*, probably as natives of that part of Galilee which was particularly famous for its luxuriant vegetation; the Galilean lowland is called Genesar or Genosar, the district immediately west of the lake Gennesar, or the Galilean garden. The name continued to attach itself to Jewish Christians in general or a particular sect among them. (See EBIONITES.) Epiphanius refers to Nazoræans as a Jewish Christian sect living in Berœa, about Cœle-Syria, and in Decapolis about the regions of Pella, and in Basanitis, who were formerly called Jessæans. Jerome speaks of Nazaræans in Berœa, referred to by the Jews as Minim, whose Gospel of Matthew, written in the Hebrew dialect (i.e., Aramaic), he had copied. The rejection of the virgin birth and the conception of Jesus as a man seem to have been characteristic of the whole sect, or at least a considerable part of it. The Nazaræans should not be confused with the Nasaræans (q.v.). Consult Hoennicke, *Das Judenchristentum im ersten und zweiten Jahrhundert* (Berlin, 1908), and Schmidtke, *Neue Untersuchungen zu den judenchristlichen Evangelien* (ib., 1913).

NAZARENE, năz'â-rēn' (Gk. Ναζαρηνός, *Nazarēnos*, from Ναζαρά, *Nazara*, Nazareth, Ναζωραῖος, *Nazōraios*, from Aram. *nāzûrâ*, branch, shoot). A descriptive term applied in the Gospels and Acts—as it is regularly applied in the Talmud—to Jesus and his disciples. The form *Nazarēnos* occurs in Mark i. 24, x. 47, xiv. 67, xvi. 6; Luke iv. 34, xxiv. 19; the form *Nazōraios*, in Matt. ii. 23, xxvi. 71; Luke xviii. 37; John xviii. 5, 7, xix. 19; Acts ii. 22, iii. 6, iv. 10, vi. 14, xxii. 8, xxiv. 5, xxvi. 9. Occurring as it does in the earliest Gospel (Mark) and in the indubitably primary narrative of the visit to Nazareth (Luke iv) as well as in the obviously primary incident of the walk to Emmaus (Luke xxiv), it is clear that *Nazarēnos* is the earlier of the two forms, and was used to designate Jesus as coming from and belonging to Nazareth, as is stated in Matt. xxi. 11 (cf. Acts x. 38; John i. 45). As Nazareth popularly (cf. John i. 46) and Galilee by the religious leaders (cf. John vii. 41, 52) were not held in repute, the term *Nazarēnos* came easily to have a contemptuous meaning when used by those not of Jesus' following (cf. Mark xvi. 67). To offset this, it is quite likely that the early Christians substituted for it the later form, *Nazōraios*, as a distinctively Messianic term, based on the prophecy of Isa. xi. 1, as is evidenced by the specific reference in Matt. ii. 23. This later form came to be the name by which the Christian communities were known within Palestine and by Jews, as Christians was the name given to the disciples in Gentile lands (cf. Acts xi. 26). There was a Jewish-Christian sect of Nazarenes, as we are informed by Jerome and Epiphanius. Very little authentic information about them is obtainable, though they were apparently distinguished from the Ebionites (q.v.), as more loyal to Jesus' teachings. The gospel known as the Gospel of the Nazarenes was in all probability identical with the Gospel of the Hebrews, and was an apocryphal working over of our first canonical gospel.

NAZARENES, or **NAZ'ARITES**. A group of German painters. See PRE-RAPHAELITES.

NAZ'ARETH (Gk. Ναζαρέθ, *Nazareth*, which in all but two passages, Matt. xxi. 11; Acts x. 38, is the less-authenticated text. In place of this the better reading is Ναζαρέτ, *Nazaret*. In Matt. iv. 13 and Luke iv. 16 the best-attested text is Ναζαρά, *Nazara*, to which are doubtless due in other passages the unaccepted variants Ναζαράθ, *Nazarath*, and Ναζαράτ, *Nazarat*. From an Aramaic word of uncertain form and meaning). A town of Galilee, the modern En Nāṣira, famed as the place where Jesus passed the obscure years of his childhood (Map: Palestine, C 2). From the question of Nathanael (John i. 46) it may be inferred that it was of no special importance, and possibly was of poor repute. (Consult Conder, *Tent Work*, p. 74.) It lay on the southern slope of the Jebel el Sikh, probably somewhat higher up than the modern town, as is evident from the position of the old cisterns and tombs. From the summit of the hill (some 1600 feet above sea level) one of the finest views in Palestine is obtained, commanding the great plain of Esdraelon, from the Jordan valley on the east to the Mediterranean on the west, and southward to the hills of ancient Samaria; while northward is seen the beautiful plain of El Baṭṭōf, beyond which rise the snowy heights of Mount Hermon. With this advantaged site, the town stood apart from the main highways of travel, though within easy reach of them. This seclusion may, to a large extent, account for the fact that there is no mention of the place in the Old Testament or by Josephus. At the same time, it never could have been a very large town, as it had but one spring. At all events, we have no knowledge of its early history. The New Testament writings and the Talmud show that Jesus was popularly called, doubtless in contempt by those not in his following, the Nazarene, and his disciples Nazarenes (cf. Mark xvi. 67; Acts xxiv. 5). (See NAZARENE.) No further mention of the place is found until Eusebius, who says in his *Onomasticon* that it was 15 Roman miles eastward from Legeon (the ancient Megiddo), and not far from Mount Tabor. Epiphanius, a century later, says that it had become in his day a mere village. The Christians of the first three centuries appear to have regarded it with no consideration. In later centuries it began to attract pilgrims, and in 600 it had a large basilica. It naturally was reverenced by the Crusaders, who greatly embellished the place and transferred to it the bishopric of Scythopolis. In 1229 it was rebuilt by Frederick II. After the conquest of Palestine by the

Turks in 1517, the Christians were compelled to leave the place. About 1620 the Franciscans established themselves in Nazareth, and the great church and convent of the Annunciation was built. This has become one of the most popular pilgrim shrines in Palestine. The house in which Mary lived is said to have been miraculously transported to Loreto (q.v.), Italy. Of late years Nazareth has materially increased in population, at present containing over 11,000 souls, 4000 Moslems, 4000 Orthodox Greeks, 1000 United Greeks, 1500 Catholics, 200 Maronites, and 250 Protestants. No Jews reside in the town. Of all the traditional sites, perhaps the only reliable one is that of the Virgin's Spring, which must often have been visited by Mary and Jesus, as it is the only spring in the place. The Cliff of Precipitation is more probably the one indicated in Sanday's *Sacred Sites* (p. 59, plate xxiii B).

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NAZARETH. A borough in Northampton Co., Pa., 7 miles northwest of Easton, on the Lehigh and New England and the Delaware, Lackawanna, and Western railroads (Map: Pennsylvania, L 5). It contains the Nazareth Hall Military Academy and several places of historic interest, notably the Whitefield House and an Indian monument, both 175 years old, Gray Cottage, and Greenwood and Indian cemeteries. The borough has also a fire engine imported from England in 1791 and believed to be the oldest in the United States. Among the industrial plants are Portland cement works and manufactories of children's waists, hosiery, and musical instruments. Pop., 1900, 2304; 1910, 3978.

NAZ'ARITE (Heb. *nāzīr*, from *nāzar*, to consecrate). Among the Hebrews, one who had devoted himself in a peculiar sense to Yahwe. The term is used of two classes: (*a*) Nazarites for life and (*b*) Nazarites for a limited period. The law in Num. vi refers to the latter class alone. According to this law one who had taken the vow of Nazariteship was to abstain from wine or any intoxicating drink, not to suffer a razor to touch his head, but to let the locks of his hair grow long, and to avoid all ceremonial defilement. It is evident from these regulations—particularly the first two—that the Nazarite was to lead a life marked by the return to the simpler and rougher fashions of primitive times. The original purpose of such vows among the Hebrews, as among the Arabs, where they are also found (cf. Wellhausen, *Reste arabischen Heidenthums*, p. 143, Berlin, 1897; W. R. Smith, *Religion of the Semites*, pp. 482 et seq., London, 1894), was for war or revenge, but it was natural also to extend the customs involved to sacred seasons of the year when the deity was to be approached. So among the Arabs to this day, during the days spent by the pilgrims in Mecca (see Hajj), it is forbidden to cut the hair, and other restrictions are imposed, most of which emphasize the return in the holy season to more primitive fashions. As for the Nazarite for life, we have only two instances in the Old Testament, Samson and Samuel. The former, in so far as he embodies popular elements, represents the hero of a rude age. It is not said of him that he was to abstain from wine, and, as a matter of fact, he frequently was involved in acts (such as contact with the carcass of a lion) which brought in their wake ceremonial defilement. The long hair in his case may have originally been the natural condition, just as the hero Engidu among the Babylonians is described as hairy. In the case of Samuel the Nazariteship involves, likewise, merely the obligation to let the hair grow, and this may have been customary among the guardians of the sanctuaries, who were in a perpetual state of sanctity. The application, therefore, of the term Nazarite to Samson and Samuel in the postexilic sense of the word is due to the projection into the past of a condition which reached its development centuries after the age of these two personages. Nazariteship in time lost its old significance and became a species of private asceticism. In this sense John the Baptist is a permanent Nazarite (Luke i. 15) and Paul possibly (though not certainly) a temporary one (Acts xxi. 17–26).

Bibliography. A. Dillmann, *Die Bücher Numeri, Deuteronomium und Josua* (Leipzig, 1886); Rudolf Smend, *Lehrbuch der alttestamentlichen Religionsgeschichte* (Freiburg, 1893); Wilhelm Nowack, *Hebräische Archäologie* (ib., 1894); S. R. Driver, "The Books of Joel and Amos," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1897); Friedrich Schwally, *Der heilige Krieg in Israel* (Leipzig, 1900); G. B. Gray, "The Nazirite," in *Journal of Theological Studies* (Cambridge, 1900); J. Benzinger, *Hebräische Archäologie* (2d ed., Tübingen, 1907).

NAZARITES (from Lat. *Nazarita*, from Gk. *Nαζαρίτης*, *Nazaritēs*, from Heb. *nāzar*, to separate one's self). A Christian sect found in Hungary and particularly numerous in the Magyar districts of eastern Hungary. They believe in the Trinity, but reject transubstantiation and infant baptism. They have no priesthood, refuse to take oaths or to perform military service, and profess to go to the New Testament for their principles of life. They are said to number about 80,000.

NAZ'ARITES. See Pre-Raphaelites.

NAZIANZUS, Saint Gregory of. See Gregory of Nazianzus, Saint.

NAZIMOVA, nȧ-zē'mō-vȧ, Alla (1879–). An actress, born in Russia and educated in Switzerland. She received her early training for the stage at a dramatic school in Moscow. After playing in various provincial companies she appeared as leading lady at St. Petersburg in 1904. She visited London and New York in 1905 in Paul Orlenev's company, playing in Russian. Having entered into a contract to play in English, she made her English-speaking début in New York in 1906 after only five months' study. She is best known for her work in Ibsen. Her interpretations of Hedda Tesman in *Hedda Gabler*, Nora in *The Doll's House*, and Rita Allmers in *Little Eyolf* placed her at once in the front rank of modern actresses. She was less successful in her attempts to impersonate English and American character. Perhaps the

most notable of her later performances was in 1912, when she played Mrs. Chepstow in *Bella Donna*. In 1915 she appeared for the first time in vaudeville, in a one-act play called *War Brides*.

NAZ'IRITE. The same as NAZARITE (q.v.).

NAZORÆ'ANS. See NAZARÆANS.

NEÆ'RA (Lat., from Gk. *Νέαιρα, Neaira*). The name of several nymphs in Grecian mythology and of a maiden mentioned in the poems of Horace, Vergil, and Tibullus. It is used also in Milton's *Lycidas* to designate an imaginary charmer.

NEAGH, nā, *Ir. pron.* nā'ăG, LOUGH. The largest lake of the British Isles, in the northeastern part of Ireland, 13 miles west of Belfast (Map: Ireland, E 2). It is rectangular in shape, 17 miles long by 10 miles wide, and has a mean depth of 40 feet. It is drained northward into the Atlantic Ocean through the Bann River. Canals connect it with Belfast on the east and Lough Erne on the southwest. It abounds in fish, especially trout, char, and freshwater herring.

NEAGLE, nā'g'l, JOHN (1799–1865). An American portrait painter. He was born in Boston, but his parents moved to Philadelphia soon after his birth. Early apprenticed to a coach painter, he also received some instruction from Bass Otis, but was practically self-taught. About 1818 he began painting portraits in Lexington, Ky., New Orleans, and other cities. On his return to Philadelphia he married the daughter of Thomas Sully, the painter, from whom he received instruction and encouragement. He made rapid progress and, rising in public favor, was made director of the Pennsylvania Academy (1830–31) and first president of the Artists' Fund Society of Philadelphia (1835–44). Neagle was a good draftsman, a fair colorist, and attained striking effects of light and shade. He was clever in delineation of character but lacked sincerity and a true feeling for beauty and grace. Most of his important works are in Philadelphia. These include a full-length portrait of Patrick Lyon at the Forge (1829, Pennsylvania Academy), an enlarged replica of the study in the Boston Museum, which first gained him a reputation (1826). The portraits of Clayton and Cornelia Earl are also in the Pennsylvania Academy. Other well-known portraits in Philadelphia are those of Rev. Dr. Joseph Tilmore, St. George's Hall; Henry Clay, Union League Club; Dr. Thomas Parke, City Library; and George Washington, Independence Hall. Neagle's portrait of Gilbert Stuart in the Athenæum, Boston, painted during a visit to that city, is considered the best existing likeness of Stuart.

NEAL, DANIEL (1678–1743). The historian of the Puritans, born in London. He entered Oxford, but left, before completing the course, to study for the dissenting ministry in England and Holland. In 1703 he returned to England, in 1706 became pastor of an independent congregation in Aldersgate Street, London, and remained at its head to the end of his life. His first work, a *History of New England* (1720), won for him the honorary degree of master of arts from Harvard in 1721. Neal's greatest work, however, was the *History of the Puritans* from the Reformation to 1689, originally undertaken by him in conjunction with Dr. John Evans. Dr. Evans died in 1730, and Neal completed the work himself (4 vols., 1732–38). It was, on the whole, very favorably received by the Puritans, but Neal's studied misrepresentation and suppression of facts evoked criticism. Nevertheless the history is for the most part a scholarly piece of work.

NEAL, DAVID DALHOFF (1838–). An American historical and portrait painter. He was born at Lowell, Mass., and after removal in youth to San Francisco was employed in making drawings on wood. In 1862 he went to Munich, where he studied under his father-in-law, the Chevalier Maximilian Ainmüller, and at the Academy under Wagner. From 1869 to 1876 he was a pupil of Piloty. After 1879 he principally practiced portrait painting. In his technique and ideals he belongs to the Munich school and has little that is distinctively American. Among the works in his early style are the "Chapel of the Kings, Westminster"; "Saint Mark's"; and the "Return from the Chase." His first figure composition, "James Watt," was exhibited at the Royal Academy, London (1873). The "First Meeting of Mary Stuart and Rizzio" (1875) received the great medal from the Royal Bavarian Academy. His most noted work, "Oliver Cromwell and John Milton," is now in the Public Library, Cleveland, Ohio. His portraits owe their success to their clever characterization. Good examples are those of Rev. Mark Hopkins for Williams College; D. O. Mills; Whitelaw Reid; and Teackle Wallis (Athenæum Club, Baltimore).

NEAL, JOHN (1793–1876). An American novelist and journalist of English-Quaker descent, born in Portland, Me. Neal was self-educated and studied law at Baltimore, supporting himself by literary work with an energy that characterized him throughout his long and varied life. Between 1817 and 1819 he published *Keep Cool*, a novel in two volumes, two volumes of verse, and a five-act tragedy, *Otho*. Meantime he was admitted to the Maryland bar. In 1823 he paid a visit to England. Here he was a pioneer of American letters, attracting and compelling attention, the first American to contribute to the great quarterlies and to *Blackwood*, and becoming secretary of Jeremy Bentham. Returning to America in 1827, he took up the practice of law in Portland and in 1828 began to edit the *Yankee*, contributing much to various other magazines and newspapers, earnestly opposing capital punishment, and being an early advocate of woman's suffrage. He established a gymnasium, said to have been the first in the United States, and he was himself athletic and a sympathetic teacher and adviser of young men, notable among whom was E. A. Poe. While engaged energetically in journalism, he poured out a steady stream of novels, interspersed with other works. The more noteworthy of his chaotic, Byronic novels are *Randolph* (1823) and *Logan* (1823). *Rachel Dyer* (1828) and *The Down Easters* (1833) are soberer, but not memorable productions. The interesting autobiography, *Wandering Recollections of a Somewhat Busy Life* (1869), was practically the last of his voluminous writings, all of which are characterized by haste, but not less by an ebullient talent and a distinctive flavor of nationality.

NEALE, nēl, EDWARD VANSITTART (1810–92). An English Christian Socialist, born at Bath and educated at Oriel College, Oxford. He became an advocate of social reform and joined the group of Christian Socialists under Frederic

Denison Maurice (q.v.). Neale founded the first coöperative stores in London. In order that the coöperative principle might take firm root and grow, he was especially anxious that associations of producers should be formed to supplement the work of associations of consumers; and he held that the former could only be established by engaging in the wholesale trade. He contended also that coöperators engaged in wholesale production should share profits with their factory operatives. He assisted in forming several industrial societies, was a founder of the North of England Coöperative Wholesale Society in 1863, of the Cobden Mills in 1866, and of the Agricultural and Horticultural Association in 1867, and general secretary to the Central Coöperative Board from 1875 until 1891. He visited America in 1875 and published the results of his observations in the *Coöperative News*. He was a director of the Coöperative Insurance Company and of the Coöperative Newspaper Society, and a Vansittart Neale scholarship at Oriel College for the sons of coöperatives was founded in his honor in 1890. He had an important influence in procuring coöperative legislation, especially the Consolidation Act of 1862 and the Industrial and Provident Societies Act of 1876. Neale was also a thoughtful student of biblical and religious questions. His writings include: *The Characteristic Features of Some of the Principal Systems of Socialism* (1851); *The Analogy of Thought and Nature Investigated* (1863); *The Mythical Element in Christianity* (1873); *A Manual for Coöperators* (1881), in collaboration with Thomas Hughes (q.v.).

NEALE, John Mason (1818–66). An English author and hymnologist, born in London. He graduated at Trinity College, Cambridge, in 1840 and in 1842 was ordained priest in the Church of England. While chaplain and tutor at Downing College, he came under the influence of the Oxford movement (q.v.), warmly embraced High Church views, and adhered to his principles in spite of severe criticism. By reason of poor health and also on account of opposition to his religious views he failed to receive fitting advancement in the church and was for many years obliged to content himself with the wardenship of Sackville College, East Grinstead, a charitable foundation. While there he became the founder of an Anglican sisterhood of St. Margaret. His extensive writings on theological and ecclesiastical subjects include *A History of the So-Called Jansenist Church in Holland* (1858) and *Mediæval Preachers* (1857). He translated the several parts of Bernard of Cluny's *De Contemptu Mundi*, "Jerusalem the Golden," and in 1863 published *Hymns of the Eastern Church*. He also published, in addition to various collections of hymns: *History of the Jews* (1841); *An Introduction to the History of the Holy Eastern Church* (1850); *Stories for Children from Church History* (1850); *Theodore Phranza, or the Fall of Constantinople* (1857); *History of the Council of Florence* (1861); *Essays on Liturgiology and Church History* (1863).

NEANDER, nâ-än'dĕr, Johann August Wilhelm (1789–1850). One of the most famous of ecclesiastical historians. He was born at Göttingen, Jan. 17, 1789, of Jewish parentage and received his early education at the Johanneum in Hamburg. On Feb. 15, 1806, he publicly renounced Judaism and was baptized in St. Catharine's Church, Hamburg, changing his name from David Mendel to Neander (from Gk. *νεός, neos*, new + *ἀνήρ, anēr*, man, in allusion to the religious change which he had experienced) and taking his Christian names from several of his friends. He now proceeded to Halle, where he studied theology under Schleiermacher and concluded his academic course at his native town of Göttingen. In 1811 he took up his residence at Heidelberg University as a privatdocent, in 1812 he was appointed extraordinary professor of theology, and in the following year was called to the newly established University of Berlin as professor of Church history. Here he labored till his death, July 14, 1850. Neander enjoyed great celebrity as a lecturer. Students flocked to him, not only from all parts of Germany, but from the most distant Protestant countries. His works, in the order of time, are: *Ueber den Kaiser Julianus und sein Zeitalter* (1812); *Der heilige Bernhard, und sein Zeitalter* (1813); *Genetische Entwicklung der vornehmsten gnostischen Systeme* (1818); *Der heilige Johannes Chrysostomus und die Kirche, besonders des Orients, in dessen Zeitalter* (1821–22); *Denkwürdigkeiten aus der Geschichte des Christenthums und des christlichen Lebens* (1822–24); *Antignosticus, Geist des Tertullianus und Einleitung in dessen Schriften* (1826); *Allgemeine Geschichte der christlichen Religion und Kirche* (1825–52); *Kleine Gelegenheitsschriften* (1824); *Geschichte der Pflanzung und Leitung der christlichen Kirche durch die Apostel* (1832–33); *Das Leben Jesu Christi in seinem geschichtlichen Zusammenhange*, written as a reply to Strauss's work (1837); *Wissenschaftliche Abhandlungen*, published by Jacobi (1851); *Geschichte der christlichen Dogmen*, also published by Jacobi (1856); and several other posthumous works. The majority of these works have been translated into English, viz., *General History of the Christian Religion and Church* (trans. by Joseph Torrey, 12th ed., 5 vols., Boston, 1882); *History of the Planting and Training of the Christian Church by the Apostles* (trans. by Ryland, 1842); *Memorials of Christian Life in the Early and Middle Ages* (trans. by Ryland, 1832); *Life and Times of Saint Bernard* (trans. by Miss Matilde Wrench, 1843); *Life of Chrysostom* (trans. by Stapleton, 1845); *Life of Jesus Christ* (trans. by McClintock and Blumenthal, 1848); *Lectures on the History of Christian Dogmas* (trans. by Ryland, 1858); *The Emperor Julian* (trans. by Cox, 1850); and his commentaries on Philippians, James, and First John.

Bibliography. Philip Schaff, in *Germany, its Universities, Theology, and Religion* (Philadelphia, 1857); id., *Saint Augustine, Melancthon, Neander* (New York, 1886); L. Schulze, *August Neander* (Leipzig, 1890); A. Wiegand, *August Neander's Leben* (Erfurt, 1890), containing a bibliography; K. T. Schneider, *August Neander* (Schleswig, 1895); also Adolf Harnack, *Rede auf August Neander* (Berlin, 1889).

NEANDERTHAL (nâ-än'dĕr-täl') **MAN.** See Man, Science of, *Ancient Types.*

NEAP'OLIS (Lat., from Gk. Νεάπολις, new town). The Neapolis mentioned in the New Testament was an ancient town, the seaport of Philippi in Macedonia. The modern town of Kavalla (Map: Balkan Peninsula, E 4), with about 5000 inhabitants, is on or near its site. Paul landed here when he sailed from Troas to begin his missionary labors in Europe (Acts xvi. 9–11). The town lay on a bay, affording

excellent anchorage, nearly opposite the island of Thasos, and about 9 miles from Philippi.

NEAP'OLIS. The ancient name of Naples (q.v.).

NE'APOL'ITAN FEVER. See MALTA FEVER.

NEAP TIDES. See TIDES.

NEARCHUS, nē-är'kŭs (Lat., from Gk. *Νέαρχος, Nearchos*). The commander of the fleet of Alexander the Great in his Indian expedition (327–326 B.C.). He was the son of Androtimus and was born in Crete, but settled in Amphipolis in Macedonia, near the Thracian boundary. He was high in favor with Philip, but was banished on account of his adherence to Alexander. When, however, Alexander succeeded to the throne of Macedon, Nearchus was recalled, and when the conquest of the Persian Empire was begun, he was appointed governor of Lycia and other districts in the south of Asia Minor. In 329 B.C. he accompanied Alexander to Bactria, with a body of Greek mercenaries. When his patron ordered a fleet to be built on the Hydaspes, Nearchus received the command of it. He sailed down the Indus and then to the Persian Gulf and arrived at Susa in Persia, Feb. 24, 324 B.C., shortly after Alexander himself, who had marched overland. After the death of Alexander in 323 B.C. Nearchus accepted the decision of the other generals with regard to the position of the Kingdom and retained his own provinces under Antigonus, whom he accompanied against Eumenes. In 314 B.C. Antigonus appointed him a councilor of his son, Demetrius. Fragments of his narrative of his voyage have been preserved in the *Indica* of Arrian, of which the text was edited by Müller (Paris, 1846). Consult J. W. McCrindle, *Invasion of India by Alexander the Great* (new ed., London, 1896).

NEARC'TIC REGION (from Gk. *νέος, neos*, new + *ἀρκτικός, arktikos*, arctic, northern). A region in zoögeography including the entire continent of North America, except the hot coast lands of Mexico. It is a part of Arctogæa, or the Holarctic region, in the view of those who regard the Northern Hemisphere as a unit in zoögeography; but in the scheme of Sclater and Wallace it is one of the six primary regions, coördinate with the Palæarctic province. (See DISTRIBUTION OF ANIMALS, *Zoögeographical Map.*) Of further interest here are the subdivisions or local faunal areas that have been distinguished. The earliest attempt at this set apart three regions: an Eastern, from the Atlantic to the plains; a Central, including the dry interior plains; and a Western, the Pacific slope. As early as 1854 Louis Agassiz stated that the eastern half of the continent contained three faunas: a northern, which he called Canadian; a middle (Great Lakes to the latitude of Kentucky), which he called Alleghanian; and a southern or Louisianian. Later writers, especially Allen, dealing mainly with birds, made eight zones in succession from north to south: Arctic, Hudsonian, Canadian, Alleghanian, Carolinian, Louisianian, Floridian, and Antillean. Ornithologists still use this classification east of the Mississippi River. Subsequently Merriam announced the opinion that there was no reason for recognizing a Central province, and that too much stress had been laid upon the dissimilarities between Eastern and Western animals. He asserted the view that only two primary subdivisions of the Nearctic region should be made: a Boreal province and a Sonoran province. The former stretches from New England and the Great Lakes northwest across Canada to Alaska and sends down long arms along the heights of the Alleghanies and the Rocky Mountains and along the Pacific coast, whose fauna is a mingled one. Everything south of this is Sonoran, embracing nearly all the United States, a great area of the plains of northwestern Canada, and all of Mexico except the low tropical coast lands. These generalizations, however, have not been universally accepted, most critics objecting that too high rank has been accorded to the Sonoran region, whose boundaries are regarded as too indefinite to entitle it to be differentiated and outlined as Merriam proposed in his "Biological Survey of the San Francisco Mountain Region," in *North American Fauna, No. 3* (Washington, 1890). The question of the subdivision of the Nearctic region therefore remains open.

NEARING, nēr'ing, SCOTT (1883–). An American economist, born at Morris Run, Pa. He studied at the University of Pennsylvania Law School in 1901–02 and took the S.B. degree at Pennsylvania in 1905 and the Ph.D. in 1909. He taught economics at Swarthmore College from 1908 to 1913 and (as instructor and then assistant professor) at the Wharton School of the University of Pennsylvania from 1906 to 1915. His dismissal from the latter institution, without notice, was generally supposed to be due to attacks made by Nearing upon corporations controlled by certain of the university trustees. The action resulted in widespread and vigorous protest. Deeply interested in the social aspects of economics and in social reform, he published, besides periodical articles: *Economics* (1908); *Social Adjustment* (1911); *Solution of the Child Labor Problem* (1911); *Wages in the United States* (1911); *Woman and Social Progress* (1912), with his wife; *Social Religion* (1913); *Financing the Wage Earner's Family* (1914); *The New Education* (1915); *Income* (1915).

NEARSIGHTEDNESS. See SIGHT, DEFECTS OF.

NEATH, nēth. A municipal borough and river port in Glamorganshire, South Wales, on the Neath, 7 miles east-northeast of Swansea (Map: England, C 5). The town, built on the site of the Roman station Nidum, contains the remains of an ancient castle, burned in 1231, and there is also the old parish church of St. Thomas. The town received its first charter from Edward II. It is chiefly notable for refining of iron and copper ore. It also manufactures tin plate, machinery (including steam engines), bricks, chemicals, and textiles. Stone is quarried near by, and there is a large export trade in local products. It owns its gas, water, slaughterhouses, markets, tramways, library, cemetery, the Victoria Gardens pleasure ground, a fair field, and real estate worth $1,000,000. Pop., 1911, 17,586.

NEBENIUS, nā-bā'nē-ŭs, KARL FRIEDRICH (1784–1857). A German statesman and economist, born at Rhodt, near Landau. In 1819 he took a prominent part in working out the Baden constitution and for many years was the principal statesman of the Grand Duchy. In 1833 he was made Privy Councilor of State and soon afterward became Minister of the Interior and President of the Cabinet Council. Owing, however, to reactionary influences, he did not keep this position very long, retiring in 1839. In

1845 he again joined the cabinet, but the revolution of 1849 compelled him to resign, and thereafter he devoted himself entirely to literary pursuits. He published, among many treatises on political economy: *Betrachtungen über den nationalökonomischen Zustand Grossbritanniens in staatswirtschaftlicher Hinsicht* (1818); *Ueber technische Lehranstalten* (1833); *Baden in seiner Stellung zur deutschen Frage* (1850); and wrote a *Geschichte der Pfalz*, which appeared posthumously (1874).

NE'BO (from Bab. *nabû*, to call, name, proclaim). A deity of the Babylonians and Assyrians, mentioned in Isa. xlvi. 1. The name also occurs in the Old Testament as a geographical term. (See NEBO, MOUNT.) In cuneiform literature the form is Nabu or Nabium. It is no doubt Semitic and means "announcer," "proclaimer." He was consequently an oracle giver. He was the local patron deity of Borsippa, opposite the ancient city of Babylon, and it is possible that he was likewise the god of Babylon before the ascendancy of the Sumerian god Marduk, seeing that he maintained his position of importance even after Marduk had become the head of the Babylonian pantheon. (See MARDUK; MERODACH; BABYLON.) There was a shrine to Nebo in Marduk's temple at Babylon to which Nebo was carried in solemn procession on the New Year's Day, while the statue of Marduk was on the return trip carried part way back to E-zida (the true house), Nebo's temple in Borsippa. To express further the relationship to Marduk, Nebo was regarded as the son of Marduk. Nebo was the scribe among the gods (*tupshar*), the "bearer of the destiny tablets of the gods," the "writer of Esagil." As such naturally he became the god of wisdom, and it is in this capacity that he was chiefly worshiped by the Assyrians. To Nebo and his consort Tashmitum Assyrian rulers ascribe the art of writing on stone and tablets, and all learning is eventually traced back to him. In this respect he supplanted an earlier god of wisdom, Ea, whose cult reaches back to a still higher antiquity than that of Nebo or Marduk. He was identified with the planet Mercury. Consult: Morris Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898); id., *Die Religion Babyloniens und Assyriens* (Giessen, 1902–12); Zimmern, in Eberhard Schrader, *Die Keilinschriften und das Alte Testament* (3d ed., Berlin, 1902); Alfred Jeremias, *Das Alte Testament im Lichte des alten Orients* (Leipzig, 1906); Condamin, in Joseph Huby, *Christus: Manuel d'histoire des religions* (Paris, 1912).

NEBO, MOUNT. The mountain from which, according to the Book of Deuteronomy (xxxii. 49, xxxiv. 1), Moses viewed the land of Canaan before his death. It has been identified with the mountain Neba—a ridge 2643 feet above the Mediterranean, situated 5 miles southwest of Heshbon. The name Nebo also occurs as that of a town in Moab (Num. xxxii. 3 and on the Moabite stone) and a town in Judah (Ezra ii. 29). It is identical in form with the name of a well-known Babylonian god Nabu (see NEBO), whose worship appears to have spread far to the west. The tradition associating the death of Moses with Mount Nebo may have had as a starting point the existence of a sanctuary on the top of the mount or, at all events, the sacred character of the mountain.

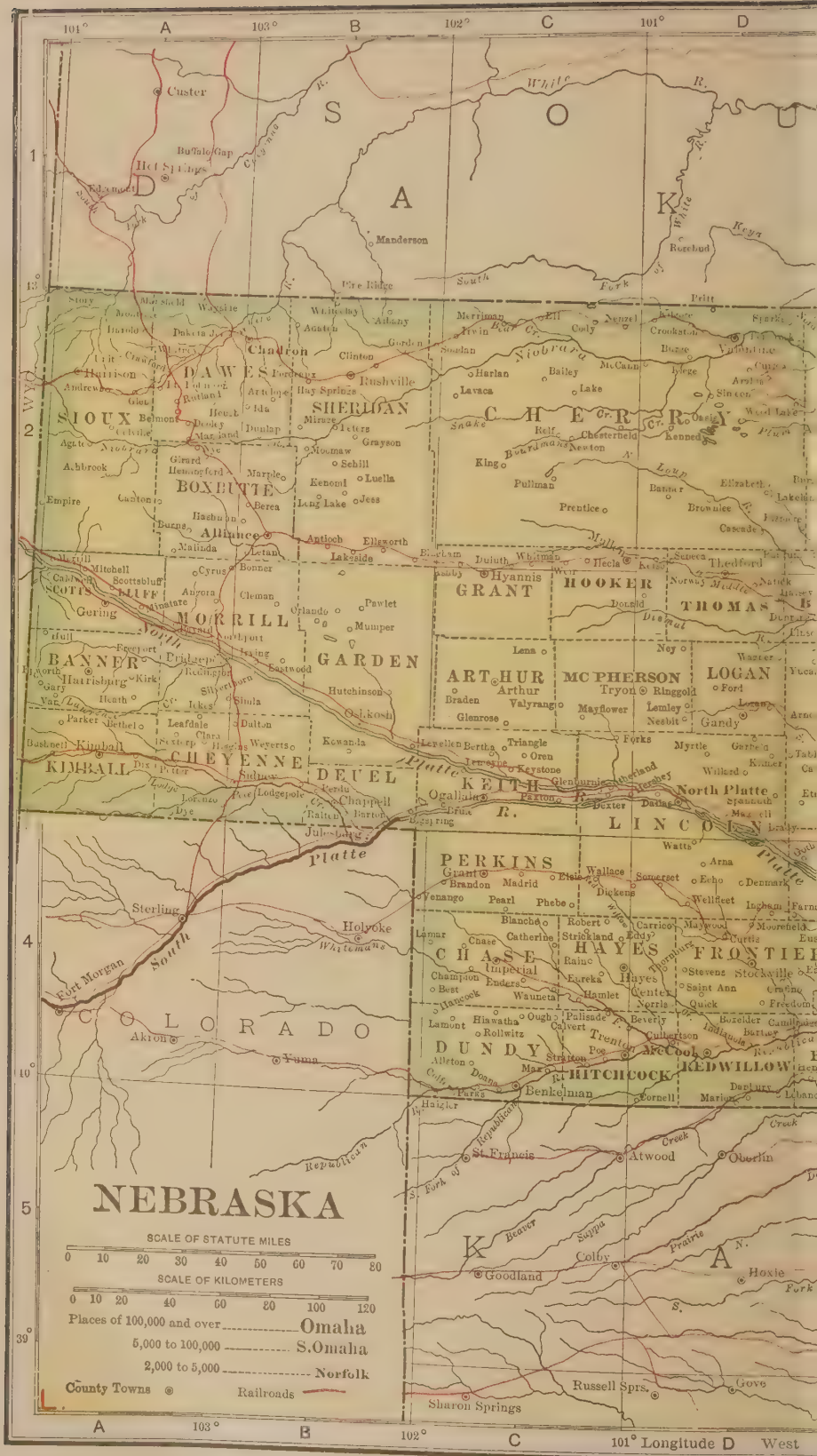
NEBRAS'KA (North American Indian, meaning flat or broad water). One of the north-central States of the American Union, popularly known as the Tree-Planter State. It lies between lat. 40° and 43° N. and between long. 95° 20′ and 104° W. It is bounded on the north by South Dakota, on the east by Iowa and Missouri, on the south by Kansas and Colorado, and on the west by Wyoming and Colorado. Its shape is that of a rectangle whose eastern end is cut off diagonally by the Missouri River and whose southwestern corner is overlapped by the northeastern corner of Colorado. Its extreme length from east to west is 455 miles, and its breadth from north to south 208 miles. Its area is 77,530 square miles, of which 712 square miles are water. It ranks fifteenth in size among the States.

Physiography. Nebraska lies in the region of the Great Plains skirting the east slope of the Rocky Mountains, towards whose foothills it rises in a gentle, undulating incline. Its whole western half lies at an elevation of more than 2500 feet above the sea. Though level in the central portion and along the lines of transcontinental travel, the land is rolling and surprisingly diversified. The physiographic relief varies from 842 feet at Rulo in southeast Nebraska to 5084 feet at Hogback Mountain, near the Wyoming line. The State has five well-defined physiographic regions—loess, drift, sand hills, bad lands, and buttes and plateaus. A line drawn from the southwest to the northeast corner divides the State into its two important physiographic regions, the agricultural loess plain in the southeastern half and the sand hills of the grazing region in the northwestern half. In the western and northwestern counties occur the famous Nebraska Bad Lands, and bordering them to the westward the butte and high plateau region.

Hydrography. The State is drained entirely by the Missouri River and its tributaries. Owing to the gentle and regular slope of the land, most of these rivers flow in nearly straight parallel lines eastward or southeastward, and they are for the most part wide and shallow. The three principal rivers, besides the Missouri (on the boundary), are the Platte in the centre, the Niobrara in the north, both flowing through the whole length of the State, and the Republican in the south, the latter coming from Kansas and returning to that State to form the Kansas River.

Climate. The climate is continental, dry, and exhilarating. The mean temperature for January is 21.7° F. and for July 74.5° F. The extremes are very great, the mercury sometimes falling to — 35° F. and even — 45° F. and at times rising to 114° F. The nights are cool. The climate of the western third of the State is, however, quite arid, and differs considerably from that of the eastern third, where agriculture is very successful. The annual rainfall is 23 inches, but this is very unevenly distributed. Averaging about 32 inches in the east, it is sufficient to support agriculture. In the western half it is below 20, and in the extreme west as low as 12 inches, so that here agriculture depends on irrigation and "dry-farming" culture. The greatest amount of rain falls in May and June, and more than three-fourths of the annual rain falls during the six months of the growing season, April to September. The prevailing winds of winter are from the northwest, while those of the summer are from the south and southeast.

Soils. More than half of the State is covered with glacial drift and loess, the drift being confined to the eastern counties. The loess deposits


NEBRASKA
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County Towns
Railroads
101° Longitude West
Custer
Buffalo Gap
Hot Springs
Manderson
Rosebud
Pine Ridge
Harrison
Chadron
Rushville
Lavaca
Harlan
Bailey
Lake
Belmont
Hay Springs
Merriman
Crookston
Valentine
Ashbrook
Alliance
Antioch
Ellsworth
Hyannis
Thedford
Mitchell
Scottsbluff
Gering
Bridgeport
Oshkosh
Ogallala
North Platte
Sterling
Holyoke
Fort Morgan
Akron
Yuma
Goodland
St. Francis
Atwood
Oberlin
Benkelman
Haigler
Republican
Sharon Springs
Russell Spgs.
Gove
Hoxie
Colby
Prairie
Beaver
Sappa
Creek
Platte
South
White
Niobrara
Snake
Loup
Middle
Dismal
Frenchman
Medicine
Whitemans
Republican
Fork
Creek
SIOUX
DAWES
SHERIDAN
CHERRY
BOX BUTTE
SCOTTS BLUFF
MORRILL
GARDEN
GRANT
HOOKER
THOMAS
BANNER
ARTHUR
MCPHERSON
LOGAN
KIMBALL
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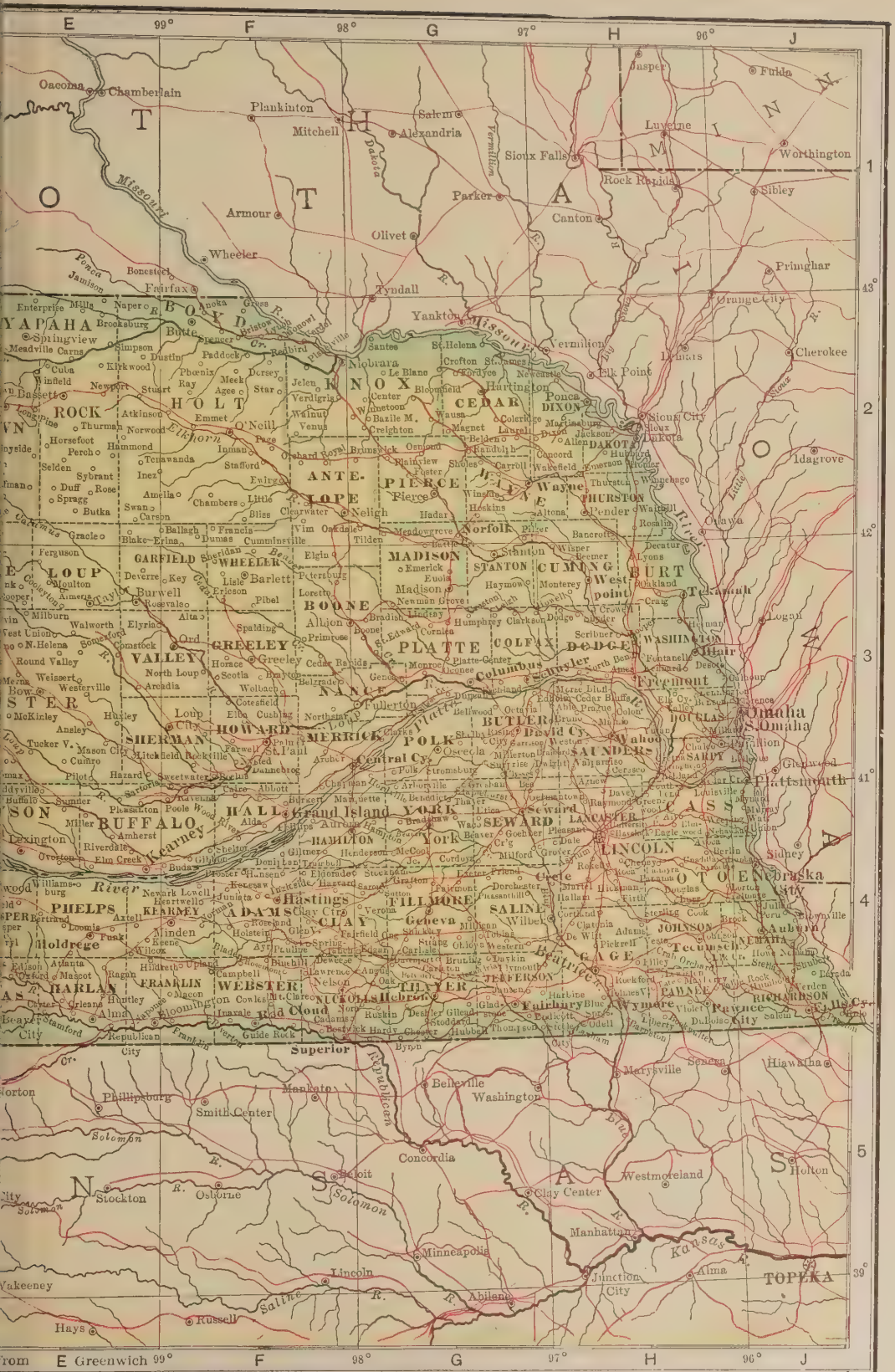
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Sioux Falls
Jasper
Luverne
Worthington
Rock Rapids
Sibley
Armour
Parker
Canton
Ollivet
Wheeler
Tyndall
Yankton
Vermilion
Primghar
Cherokee
Orange City
Niobrara
Santee
St. Helena
Crofton
St. James
Hartington
Ponca
Newcastle
Isle Point
Sioux City
Dakota
Idagrove
Bloomfield
Le Blanc
Wynot
Randolph
Concord
Wakefield
Emerson
Hubbard
Wisner
Beemer
Lyons
Decatur
Tekamah
Logan
Oakdale
Norfolk
Pilger
Stanton
Bancroft
Oldham
Madison
Emerick
Madison
Haymow
Monterey
Craig
Crowell
Dodge
Scribner
Fontanelle
Fremont
Omaha
South Omaha
Council Bluffs
Carter Lake
Glenwood
Plattsmouth
Nebraska City
Sidney
Lexington
Kearney
Riverdale
Elm Creek
Gibbon
Shelton
Newark
Lowell
Heartwell
Juniata
Hastings
Hansen
Eldorado
Stockton
Fairmont
Dorchester
Exeter
Friend
Geneva
Fairfield
Glenville
Auburn
Nemaha
Tecumseh
Johnson
Pickrell
Vesta
Cook
Brock
Sterling
Peru
Brownville
Falls City
Rulo
Holdrege
Loomis
Alma
Orleans
Republican City
Franklin
Guide Rock
Red Cloud
Superior
Hebron
Fairbury
Wymore
Blue Springs
Ravenna
Grand Island
Aurora
Hamilton
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Lincoln
Milford
Crete
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Marysville
Seneca
Hiawatha
Belleville
Washington
Phillipsburg
Smith Center
Mankato
Concordia
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Manhattan
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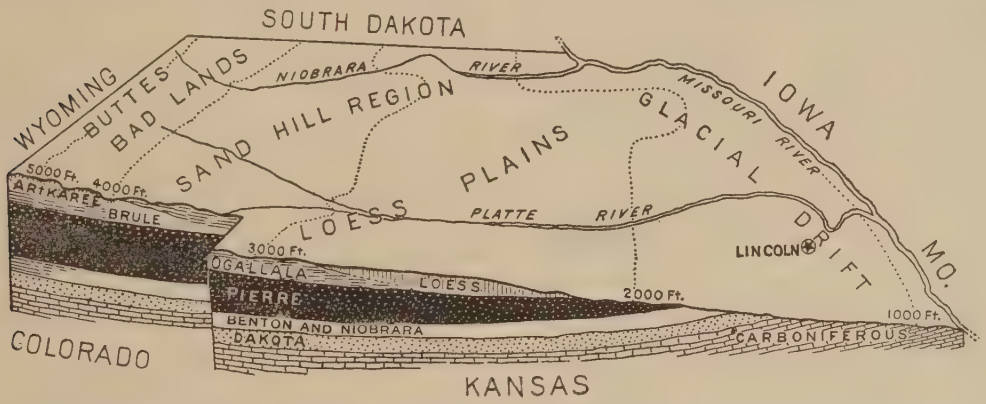
range in thickness from 5 to 150 and even 200 feet, and, though soft and easily excavated, are very compact and retentive of moisture. They form a soil of inexhaustible fertility. The bluffs along the bottom lands are composed of this material. The alluvial lands of the river valleys also afford an excellent soil, though scarcely exceeding the loess in quality. Considerable areas in the west, as much as 20,000 square miles, are covered with sand hills (q.v.). These are found partly in the southwest corner, but chiefly in the large and arid area north of the Platte and west of the one hundredth meridian.

In the extreme west the Tertiary marls, even in the Bad Lands, can be made productive by irrigation or "dry farming."

Geology. The rocks of Nebraska may be described as undisturbed sediment, the older dipping slightly to the west, where they disappear. The outcrops of all the successive formations have a direction slightly east of north, and are found along the narrow valleys of certain streams. The oldest beds are the Pennsylvanian, exposed in the southeastern corner from Lincoln eastward, consisting essentially of about 1200 feet of limestone interspersed with shale. At Lincoln the Carboniferous disappears. Triassic and Jurassic rocks are wanting, but the Cretaceous series is well developed and underlies the entire State west of Lincoln. The Dakota (Cretaceous), composed of coarse ferruginous sand and clay, about 300 feet in thickness, outcrops from Jefferson County, through Lincoln in a general northerly and easterly direction to Dixon County. This is the water-bearing bed of the Great Plains. Twenty miles west of Lincoln some 20 feet of Graneros shales outcrop and are overlain by as many feet of Greenhorn limestone paralleling and overlying the Dakota, from Thayer to Dixon County. Just west of this, parallel to and superimposed upon it, comes 300 feet of Carlisle shale capped by 25 to 50 feet of Niobrara chalk. A line from Webster to Cedar County gives the general direction of the outcrops of these two formations. Next above these, and parallel to them, the Pierre shale outcrops in a general direction from Franklin to Knox County. The Pierre is the most extensive member of the Cretaceous, and attains a thickness of several thousand feet. Overlying the Pierre are many feet of early, middle, and late Tertiary beds, the oldest being the Bad Lands formation (Oligocene). The paleofauna of this well-known collecting ground varies between wide limits, and has attracted paleontologists from all institutions and countries. The Bad Lands have a general elevation of about 3500 feet, and, although the rainfall is scant, the gradient is steep and the wash extensive. The Oligocene covers the western fourth of the State and has a total thickness of 500 to 600 feet. Next above the Bad Lands comes the Butte formation (mostly Arikaree) of Miocene age. Much of this butte region is covered with bull pines, *Pinus ponderosa*, hence the name Pine Ridge. Pliocene merging into Pleistocene covers the northern tier of counties from Brown westward. The glacial drift covers the eastern fifth of the State, and two divisions, the Nebraskan (or Jerseyan) and the overlying Kansan, are distinct. Much of this formation is confounded with the loess, which lies directly above the drift, and which varies in thickness up to 150 feet. It is a light buff deposit consisting essentially of fine silt and fine sand, with varying amounts of lime, clay, and humic matter. It is believed to be partly æolian and partly aqueous in origin. It is retentive of moisture, fertile, and productive, and constitutes an agricultural area of the utmost consequence.

Mineral Products. The minerals produced consist chiefly of clay products, mineral waters, pumice, sand and gravel, sand-lime bricks and stone. The value of clay products in 1913 was $886,166. In the production of pumice Nebraska enjoys almost a complete monopoly. The total value of mineral products in 1913 was $1,433,718.



MAP OF NEBRASKA SHOWING BOUNDARIES, PRINCIPAL RIVERS, ALTITUDES, PHYSIOGRAPHIC DIVISIONS, AND GEOLOGY.

Agriculture. The entire land area is approximately 49,157,100 acres, of which 38,622,021 was in farms in 1910, these numbering 129,678. The average value of land per acre in 1910 was $41.80, and the total value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, $2,079,818,647. Of the total number of farms, 80,237 were, in 1910, operated by owners and managers. In that year more than 70 per cent of the farms were from 100 to 500 acres in size.

There were, in 1910, 93,509 native white farmers out of a total of 129,678. The foreign-born white farmers numbered 35,707, and the negro and other nonwhites 462. Of the foreign-born white farmers, the greater number (15,478) were born in Germany.

The following table gives the acreage, produc-

tion, and value of some of the principal crops as estimated by the United States Department of Agriculture in 1914.

CROPS	Acreage	Prod. bu.	Value
Corn	7,100,000	173,950,000	$92,194,000
Wheat	3,668,000	68,116,000	64,710,000
Oats	2,175,000	69,600,000	27,840,000
Barley	113,000	2,656,000	1,248,000
Rye	122,000	1,952,000	1,444,000
Potatoes	118,000	9,440,000	5,098,000
Hay	1,500,000	* 2,535,000	17,492,000
Alfalfa †	1,022,485	* 3,208,055	22,466,385

* Tons. † State Board of Agriculture Report.

The total value of crops in 1909 was $196,125,632, and the combined reported acreage 17,231,205, representing 70.7 per cent of the total improved land in farms. The general character of Nebraska agriculture is indicated by the fact that nearly 80 per cent of the total value of crops was contributed by the cereals and 16.2 per cent by hay and forage. Nebraska is one of the most important corn-producing States. Census figures for 1909 show, in corn, an acreage of 7,266,057, a production of 180,132,807 bushels, valued at $88,234,846; in wheat, an acreage of 2,622,918, a production of 47,685,745 bushels, valued at $44,225,930; in hay and forage, an acreage of 4,520,034, a production of 5,776,475 tons, valued at $31,729,691; in oats, an acreage of 2,365,774, a production of 53,360,185 bushels, valued at $19,443,570. The total acreage of potatoes and other vegetables was 147,594, the production being valued at $5,931,738. Excluding potatoes and sweet potatoes and yams, the acreage of vegetables was 36,164. The production was valued at $2,118,393.

A large quantity of orchard fruits is produced. This amounted in 1909 to 3,572,253 bushels, valued at $1,932,124. Apples contributed more than nine-tenths of this quantity, peaches, nectarines, and cherries most of the remainder. The production of grapes in 1909 amounted to 4,752,217 pounds, valued at $137,295. Strawberries are the most important of the small fruits, with blackberries and dewberries ranking next. The total acreage of small fruits in 1909 was 1411, and the production 1,594,421 quarts, valued at $159,169. The growing of sugar beets has become an important industry. The total acreage of this crop in 1909 was 4191, and the production 39,874 tons, valued at $180,247.

Live Stock and Dairy Products. Stock raising is of great importance. The total value of live stock on farms in 1910, including poultry and bees, was $222,222,000. Cattle are raised in large quantities for market, and dairying is an important industry. The following figures are the estimates of the United States Department of Agriculture for Jan. 1, 1915: dairy cows, 625,000, valued at $39,062,000; cattle, other than dairy cows, 2,034,000, valued at $82,987,000; horses, 1,038,000, valued at $95,496,000; mules, 85,000, valued at $8,925,000; swine, 3,809,000, valued at $41,518,000; sheep, 374,000, valued at $1,795,000. The total value of milk, cream, and butter fat sold and butter and cheese made in 1909 was $10,566,275. The milk sold amounted to 6,500,380 gallons, and the butter sold to 11,652,068 pounds. The total number of fowls of all kinds in 1910 was 9,351,830, valued at $4,219,158.

Irrigation. Irrigation is practiced to a considerable extent in the western part. In 1909, 1852 farms, or 1.4 per cent of the total number, were irrigated. The area of irrigated land in 1912 was 273,018 acres. Enterprises operating in 1914 were capable of supplying water to an area of 684,642 acres, and the total area included under all irrigation projects, completed or under way, was 951,000 acres.

Forest Products. The total forest area in 1908 was 800,000 acres, or less than 2 per cent of the total land area. The total value of the output of lumber in 1909 was $2,021,366. In addition there were produced during the same year on the farms forest products valued at $795,053.

Manufactures. In 1909 Nebraska ranked twenty-fifth among the States in the value of manufactured products, and the value per capita was $167. The table (p. 675) gives the most important figures relative to manufactures for 1909 and 1904.

Owing partly to the natural advantages for feeding cattle, and partly to location in the centre of the corn and cattle-raising sections of the country, the slaughtering and packing of meat is the most important industry. A large amount of live stock is bred in Nebraska, and much is brought from other States to be fattened for market. In 1909 the State ranked fourth in the value of such products.

The centre of the slaughtering and meat-packing industry is South Omaha, which is surpassed in this respect only by Kansas City, Mo., and Chicago. The importance of this industry is best indicated by the fact that in 1909 it gave employment to 24.7 per cent of the total number of wage earners engaged in all manufacturing industries and contributed 46.4 per cent of the aggregate value of products. Beeves slaughtered in 1909 numbered 651,258; sheep, 1,127,962; and hogs, 2,103,602. The total value of the fresh beef produced was $26,914,613, and the pork was valued at $8,624,522. Flour and gristmill products ranked second in point of industrial value. The most important of these products is white flour, of which there were produced, in 1909, 2,252,828 barrels, valued at $11,379,662. Large quantities of graham flour, corn meal, rye flour, and buckwheat flour are also produced. Butter is the chief output of the dairies. Other important industries not mentioned in the table are those in connection with the manufacture of men's clothing, gas, artificial stone, paint and varnish, confectionery, brick and tile, and tobacco.

The total number of wage earners in 1909 was 24,336, of whom 20,941 were males. The wage earners 16 years of age and under numbered 217, of whom 178 were males. For the great majority of wage earners the prevailing hours of labor range from 54 to 60 a week and from 9 to 10 hours a day.

The four cities having a population of over 10,000 in 1910, Omaha, Lincoln, South Omaha, and Grand Island (qq.v.), gave employment to 70.2 per cent of the total number of wage earners and produced 81.5 per cent of the total value of products. South Omaha, engaged almost exclusively in the slaughtering and meat-packing industries, had in 1909 a manufacturing output valued at $95,435,712. Omaha, which in 1909 had 8023 wage earners, manufactured products valued at $60,824,550. The smelting and refining of lead is by far the most important industry of this city.

Transportation. The eastern and more popu-

lous section of the State greatly exceeds in mileage the western, which has but one line running north and south. The State is crossed from east to west by three large railroad systems—the Chicago, Burlington, and Quincy, the Union Pacific, and the Chicago and North-

845,000; surplus, $8,012,335; cash, etc., $3,204,-023; loans, $96,132,273; deposits, $87,786,114. On April 21, 1915, there were 772 State banks with a capital of $16,420,000; surplus, $3,985,-311; cash, $5,297,151; loans, $95,629,881; total individual deposits, $100,952,813.

SUMMARY FOR 1909 AND 1904

THE STATE — TEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	2,500	31,966	24,336	$99,901	$13,948	$199,019	$47,938
	1904	1,819	25,356	20,260	80,235	11,022	154,918	30,866
Bread and other bakery products	1909	279	1,155	646	1,092	373	3,014	1,342
	1904	138	567	383	654	188	1,351	631
Butter, cheese, and condensed milk	1909	37	602	383	2,975	256	7,681	1,246
	1904	40	390	253	1,861	137	3,326	654
Cars and general shop construction and repairs by steam-road companies.	1909	13	4,021	3,685	6,311	2,271	4,642	2,918
	1904	30	3,626	3,245	5,975	2,109	4,395	2,478
Flour-mill and gristmill products	1909	249	1,455	839	9,472	519	17,836	2,619
	1904	234	1,324	863	6,497	468	12,190	2,037
Foundry and machine-shop products	1909	73	1,346	1,020	2,808	595	2,930	1,414
	1904	46	626	518	920	287	1,092	664
Leather goods	1909	30	365	266	988	197	1,583	605
	1904	22	364	247	906	146	983	447
Liquors, malt	1909	14	547	424	3,999	290	3,335	2,710
	1904	16	338	265	2,558	186	1,664	1,205
Lumber and timber products	1909	48	707	543	1,155	356	2,021	795
	1904	27	416	356	379	234	645	381
Printing and publishing	1909	674	3,884	2,329	4,979	1,397	6,667	4,956
	1904	631	3,326	2,073	3,616	1,093	4,991	3,697
Slaughtering and meat packing	1909	18	7,221	6,015	19,414	3,372	92,305	13,947
	1904	9	6,462	5,590	20,606	3,159	69,329	8,051

western. The total steam-railroad mileage of main track in 1914 was 6148. The most important lines and their mileage are: the Chicago, Burlington, and Quincy, 2850; the Union Pacific, 1184; the Chicago and Northwestern, 1071; the Missouri Pacific, 371; the Chicago, Rock Island, and Pacific, 246; the Chicago, St. Paul, Minneapolis, and Omaha, 308; the St. Joseph and Grand Island, 112. The total mileage of electric railway in 1914 was 220. The steam and electric railways are under the complete jurisdiction of the State Railway Commission.

Banks. The first session of the Territorial Legislature in 1855 pronounced currency banking a crime, and no banks were chartered. The necessity for currency, however, was such that insurance companies issued a disguised form of paper money. In 1856, under special charters, certain institutions did a banking business, in spite of the laws to the contrary. The general panic of 1857 swept all such institutions out of existence. For almost a decade all the banking business was performed by private banks; then national banks began to be organized.

A considerable increase in the number of banks came about in 1880, when the era of railroad building commenced. An Act regulating banks was passed in 1889, establishing a State Banking Board and providing for reports and examinations. In 1909 Nebraska passed a bank guaranty act, which has proved very successful in operation. In 1893 there were eight savings banks in Omaha, but only one existed in 1900. On Sept. 12, 1914, there were 220 national banks with an aggregate capital of $15,-

Government. The present constitution was adopted in 1875. Amendments may originate in either branch of the Legislature or among the people, but to become a part of the constitution must be agreed upon by three-fifths of the members of each House and carried by a majority of the electors.

Legislative.—The Legislature consists of a Senate and a House of Representatives. The House of Representatives, by reapportionment made in 1911, consists of 77 members, and the Senate of 28 members. The number of Representatives must never exceed 100 nor the Senators 33. Sessions of the Legislature are biennial and begin on the first Tuesday in January in the year next following the election of members. After the expiration of 20 days of the session, no bills or joint resolutions of the nature of bills may be introduced, except with regard to matters relative to which the Governor shall, in special message to the Legislature, call its attention to the necessity of legislation. The initiative and referendum have been adopted and are in full force. The term of office for both Senators and members of the House is two years.

Executive.—The executive department of the State consists of a Governor, Lieutenant Governor, Secretary of State, Auditor of Public Accounts, Treasurer, Superintendent of Public Instruction, Attorney-General, and Commissioner of Public Lands and Buildings. Each holds office for the term of two years. The Governor and Lieutenant Governor must have attained the age of 30 years. The Treasurer is ineligible to the office for two years next after

the expiration of two consecutive terms for which he was elected.

Judiciary.—The judicial power is vested in a supreme court, district courts, county courts, justices of the peace, police magistrates, and such other inferior courts as may be created by the Legislature. The State is divided into six judicial districts, in each of which there is elected, for a term of four years, one judge of the district court. In each organized county there is elected for two years a judge of the county court.

Suffrage and Elections.—Every male person of the age of 21 years or upward, who has resided in the State for six months and in the county, precinct, or ward for the term provided by law, may be an elector, provided that he is a citizen of the United States or that he, if a person of foreign birth, shall have declared his intention of becoming a citizen at least 30 days prior to the election. The general election is held every two years, on the Tuesday next succeeding the first Monday in November. All candidates for elective offices, except those expressly excepted, are nominated by primary elections. Provision is made for the preference vote for President and Vice President of the United States and for United States Senator. There is a stringent corrupt-practices act, limiting and regulating the expenditures of candidates for office.

Local and Municipal Government.—The Legislature may form no new county of an area less than 400 square miles nor reduce any county to less than that area. Counties may organize into townships whenever a majority of the legal voters of such county shall so determine. Cities of the first class (between 5000 and 100,000 in population) may frame a charter for their own government.

Miscellaneous Constitutional and Statutory Provisions.—Property acquired by a wife after marriage remains separately her own. Women who own assessed property or who have children of school age may vote in school meetings. The sale of liquor is regulated by local option. Under the State law, however, all saloons are compelled to close at 8 P.M. and remain closed until 7 A.M. There is also a law forbidding the sale of liquor on dining cars and in all territory within 2 miles of an incorporated city or village.

Finance. Nebraska has no bonded or funded debt. The floating debt, composed entirely of outstanding warrants, amounted, on Nov. 30, 1912, to $374,394. The State constitution provides that the revenue from certain sources be set aside for a perpetual common-school fund, the income only being available. The fund in 1912 amounted to $8,482,143. The university fund, amounting to $218,377, was derived from the sale of 45,426 acres of land granted by Congress. Other funds include the agricultural college fund, amounting in 1912 to $545,064, the normal endowment fund, and general and special funds. The debt per capita was 31 cents in 1912. The total receipts for one year ending Nov. 30, 1914, were $6,451,742; the expenditures, $6,346,034. On that day there was a balance of $746,108 in the treasury.

Militia. The males of militia age (18–44) in 1910 numbered 267,497. The organized militia comprises one brigade, including two regiments of infantry, a company of signal troops, and a detachment of sanitary troops. The total strength in 1915 was 1264 privates and 131 officers.

Population. The population by decades is as follows: 1860, 28,841; 1870, 122,993; 1880, 452,402; 1890, 1,058,910; 1900, 1,066,300; 1910, 1,192,214. The est. pop. in 1914 was 1,245,873; 1920, 1,296,372. The population per square mile in 1910 was 15.5, compared with 13.9 in 1900. The larger part of the population is in the southeastern counties, the western half being, on account of its aridity, rather sparsely populated. The urban population, i.e., that of places of 2500 or over, in 1910 was 310,852, and the rural 881,362. The foreign-born population numbered 24,361; native whites of foreign or mixed parentage, 362,353, and negro, 7689. The largest number of foreign-born whites came from Germany. The population was divided in 1910 into 627,782 males and 564,432 females. The males of voting age numbered 353,626. The largest city is Omaha with a population in 1910 of 124,096 and in 1914 (estimated) of 133,274. Some other cities with their populations in 1910 and 1914 (estimated) are as follows: Lincoln, 43,973, 45,643; South Omaha, 26,259, 26,368; Grand Island, 10,326, 11,505; Hastings, 9338, 10,252; Fremont, 8718, 9345.

Education. The general excellence of educational conditions in Nebraska is indicated by the fact that only one other State, Iowa, had a smaller percentage of illiteracy in 1910. Of a population of 10 years of age and over numbering 924,032, there were in that year 18,009 illiterates. The percentage of illiteracy among the native whites of native parentage was 0.6, among foreign-born whites 7.1, and among the negroes 7.2. According to the thirteenth census the total school population, ages 6 to 20 years, was 373,868, and of this number 261,219 were attending school. The report of the State Superintendent of Education for 1914 shows a total school population (ages 5 to 21 years) of 383,882, a total school enrollment of 288,369, and an average daily attendance of 214,152. The total number of teachers employed in that year was 12,018, of whom 10,549 were women and 1449 men. The average monthly salary of men teachers was $84.25 and of women teachers $58.70. The total expenditure for public schools is over $10,000,000 per year. There were 240 accredited high schools in 1913. In addition there were 192 nonaccredited high schools approved by the State Superintendent under the free-high-school law. Special attention has been given in recent years to agricultural training in the high schools, and in 1913 legislation was enacted permitting qualified high schools to give training in agriculture, manual training, and home economics. The State has a free-textbook law. The State normal schools are situated at Peru, Kearney, Wayne, and Chadron. The University of Nebraska, a part of the educational system of the State, is situated at Lincoln. The other institutions of higher education, all coeducational, are Bellevue College at Bellevue, Cotner University at Bethany, Union College at College View, Doane College at Crete, Grand Island College at Grand Island, Hastings College at Hastings, University of Omaha at Omaha, the Nebraska Wesleyan University at University Place, and York College at York. Creighton University at Omaha is a Roman Catholic institution for men. There is also a school of agriculture at Curtis.

Charities and Corrections. The charitable and correctional institutions under control of the State include the Institute for the Blind at Nebraska City, the Institute for the Deaf and Dumb at Omaha, the Institute for the Feeble-Minded at Beatrice, the Industrial School for Juvenile Delinquents at Kearney, a Girls' Industrial School at Geneva, an Industrial Home for Girls at Milford, asylums for the insane at Lincoln, Norfolk, and Hastings, an Orthopedic Hospital for Crippled and Deformed Children at Lincoln, soldiers' and sailors' homes at Grand Island and Milford, the State penitentiary at Lincoln. There are a juvenile-court law and a board of control for dependent and neglected children. Prisoners may be subjected to an indeterminate sentence and have, at the discretion of the State Prison Board, the privilege of parole.

Religion. The Church members or communicants in the State form only about 30 per cent of the total population. The principal denominations in order of their numerical strength are the Roman Catholic, comprising over one-fourth of the Church members, Methodist, Lutheran, Presbyterian, Christian, Baptist, and Congregational.

History. The territory now constituting the State was originally a part of the Louisiana Purchase and afterward a part of Missouri Territory. Coronado (q.v.), setting out from Mexico in search of the seven cities of Cibola and of Quivira, claimed that in 1541 he journeyed on the great plain as far as lat. 40° N., the southern boundary of the State. There are stories of other Spanish explorations, but little is known of them. In 1673 Marquette passed the mouth of the Missouri and marked the Platte from Indian stories. Pierre and August Chouteau, brothers engaged in the fur trade, reached the Platte about 1807. Lewis and Clark, in 1804–06, skirted the eastern boundary of the present State. The *Trudeau Journal* (discovered 1912) shows there were trading posts as early as 1794. The American Fur Company placed one at Bellevue in 1810, and posts were established at Omaha in 1825 and at Nebraska City in 1826. Fort Atkinson was established in 1819, but abandoned in 1827. With the admission of Missouri as a State in 1821, the territory was left practically without government. In 1834 part of the western Indian country was attached to Arkansas, the jurisdiction of the district court at Missouri was extended over another part, and a third portion was joined to Michigan Territory. The next year Col. Henry Dodge, with a force of dragoons from Fort Leavenworth, marched up the Platte valley to the forks and thence up the South Platte to the mountains. Many tribes of the Eastern Indians were then being transferred to this "Indian country."

New Fort Kearney was established on the Oregon trail in 1848.

Thousands of gold seekers passed through the Territory in 1849–50, and some stopped on the way in utter defiance of the law which forbade settlement among the Indians. The partly civilized tribes near Fort Leavenworth, who foresaw the inevitable extension of white settlement, wished for a territorial government in order to sell lands to better advantage. The Wyandots, led by their half and quarter bloods, in 1851–52 petitioned Congress to establish a Territory, with no success. A territorial delegate, Abelard Guthrie, was chosen in October, 1852. A bill to organize Nebraska Territory passed the House Feb. 2, 1853, but did not reach a vote in the Senate. In order to force action, a provisional government was organized by the residents, and William Walker was elected Governor July 25, 1853. Senator Douglas reported a bill in January, 1854, providing for the erection of a Territory, based on his principle of "squatter sovereignty." It was amended to provide for two Territories (see KANSAS-NEBRASKA ACT), passed both Houses, and was signed by the President May 30. By this Act the boundaries of the Territory of Nebraska were defined as the fortieth and forty-ninth parallels of latitude, from the Missouri to the summit of the Rocky Mountains. In 1861 all the region north of the forty-third parallel was constituted part of Dakota Territory, a small part from the southwest corner was added to Colorado, and the western boundary was extended to the one hundred and tenth meridian. With the creation of Idaho Territory from the northwestern portion of Nebraska in 1863, the State was reduced to its present limits except for a slight addition in the northeast in 1882.

Congress passed an enabling Act in 1864, but not until 1866 was a constitution adopted. The act of admission passed by Congress July 18 was not signed by the President. In February, 1867, he again vetoed a similar bill, but it was passed over the veto, and on March 1 the State was admitted.

Nebraska from its establishment as a State to 1896 was Republican in politics. Since that year, however, the Democrats have practically equaled the Republicans in strength. Both Republican and Democratic parties have been split by factional disturbances. Nebraska was more conservative than some of its neighboring States in the adoption of the more radical principles of government favored by insurgent or progressive wings of both parties. The "Progressives," however, attained considerable strength and succeeded for several years in electing their candidate to Congress. In the election of November, 1908, Bryan received 131,099 votes; Taft, 126,997; Chafin, 5179; Debs, 3524. The Democrats elected their candidate, A. C. Shallenberger, for Governor, and a Democratic Legislature. The Republicans elected the remaining State officers. In the State elections held in 1910 the Republicans elected their candidate, Chester H. Aldrich, Governor, and the Democrats a United States Senator, Gilbert M. Hitchcock. In 1912 the Progressive party, indorsing the Republican candidates chosen at the primaries, had no candidates for State offices. They did, however, elect delegates to vote for Mr. Roosevelt at the National Progressive Convention. In 1912 Wilson received 109,008 votes; Roosevelt, 72,678 votes; Taft, 34,216 votes; Debs, 10,185 votes; and Chafin, 3383 votes. The Democrats elected J. H. Morehead Governor by about 10,000 plurality, and Mr. Norris received the popular preferential vote for United States Senator. In this election several amendments to the constitution were carried, among these a provision for the initiative and referendum. Governor Morehead was reëlected Governor by a plurality of about 20,000 votes. The following is a list of the Governors of the State, with their party affiliations.

TERRITORIAL

Francis Burt		1854
T. B. Cuming (acting)		1854–55
Mark W. Izard		1855–57
T. B. Cuming (acting)		1857–58
William A. Richardson		1858
J. S. Morton (acting)		1858–59
S. W. Black		1859–61
A. S. Paddock (acting)		
Alvin Saunders		1861–67

STATE

David Butler	Republican	1867–71
W. H. James (acting)		1871–73
Robert W. Furnas	Republican	1873–75
Silas Garber	"	1875–79
Albinus Nance	"	1879–83
James W. Dawes	"	1883–87
John M. Thayer	"	1887–91
James E. Boyd	Democrat	*1891
John M. Thayer	Republican	1891–92
James E. Boyd	Democrat	1892–93
Lorenzo Crounse	Republican	1893–95
Silas A. Holcomb	Populist	1895–99
William A. Poynter	"	1899–1901
Charles H. Dietrich	Republican	1901
Ezra P. Savage	"	1901–03
John H. Mickey	"	1903–07
George L. Sheldon	"	1907–09
Ashton C. Shallenberger	Democrat	1909–11
Chester H. Aldrich	Republican	1911–13
J. H. Morehead	Democrat	1913–17
Keith Neville	"	1917–19
Samuel R. McKelvie	Republican	1919–

* Ousted by decision of Supreme Court, Nebraska, May, 1891; restored by decision of Supreme Court, United States, February, 1892.

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NEBRASKA. A river of Nebraska. See PLATTE.

NEBRASKA, UNIVERSITY OF. A State university for higher education founded at Lincoln, Neb., in 1869 and opened to students in September, 1871. The university forms a part of the educational system of the State. The governing body is the board of regents, which includes six members who are elected, but was formerly composed of 12 members who were appointed. Included in the university are the following colleges, each of which has its own faculty: arts and sciences, agriculture, engineering, graduate, law, medicine, teachers. A summer session is also maintained. Tuition in the university is free to residents of Nebraska in all of the colleges except the so-called professional colleges; undergraduate students who are nonresidents of the State and resident students in professional colleges pay a moderate tuition. All departments are open to both men and women. The chief sources of support are a tax of one mill per dollar of the grand assessment roll of the State, with interest from endowment land leases on sales and on permanent fund investments. The university also benefits by United States appropriations under the Morrill acts for instruction in agriculture and the mechanic arts, the Hatch-Adams acts aiding agricultural experimentation, and the Smith-Lever Act of 1914 aiding agricultural extension. On the campus in Lincoln are 13 buildings which house all the departments except a medical school, which is located at Omaha, and a school of agriculture and an experiment station conducted on the university farm of 320 acres near the city of Lincoln. The libraries of the various colleges contain 116,000 bound volumes, and the museums contain large and valuable collections. The total enrollment in all departments in 1913–14 was 4133. There were 281 members of the faculty, including 83 professors, 20 associate professors, 46 assistant professors, 68 instructors, and 64 assistants. The Legislature of 1914 provided for a special three-fourths of a mill levy upon the grand assessment of the State, continuing for six years, for securing an extension of grounds in the city of Lincoln and for new buildings and their equipment on both the city campus and the university farm; approximately $2,300,000 will be spent for the new physical plants. The chancellor in 1915 was Samuel Avery, Ph.D.

NEBRASKA CITY. A city and the county seat of Otoe Co., Neb., 53 miles south of Omaha, on the Missouri River, here spanned by a fine steel railroad bridge, and on the Missouri Pacific and the Chicago, Burlington, and Quincy railroads (Map: Nebraska, J 4). It has a United States government building, St. Bernard's Academy (Belgian) for young ladies, a fine monument to J. Sterling Morton, the State Institute for the Blind, and a public library. The city is the centre of a noted fruit belt and of a rich corn region. The principal industrial plants include large stockyards, canneries, grain elevators, flour mills, lumber and planing mills, foundries, press-drill works, a starch factory, packing and provision house, breweries, brickworks, windmill, cigar, vinegar, and pickle factories, and a cold-storage plant. Arbor Lodge, the old homestead of J. Sterling Morton, has been developed into a magnificent estate of 900 acres and contains the finest arboretum in the State. Settled in 1855 on the site of old Fort Kearney, Nebraska City was incorporated as a city of the second class in 1871 and received a charter of the first class in 1891. It has since adopted the commission form of government. Pop., 1900, 7380; 1910, 5488.

NEBRASKA WESLEYAN UNIVERSITY. A coeducational institution for higher education founded at University Place, Neb., in 1886. It is under the control of the Methodist Episcopal denomination. The university includes a college of liberal arts, a teachers' college, a conservatory of music, a school of expression and oratory, a school of art, a teachers' training course, and an academy. The total enrollment in all departments in 1914–15 was 840, and the faculty numbered 34. The university has a productive endowment of about $350,000, and the college grounds and buildings are valued at $305,800. The annual income is about $65,000. The library contains 8000 volumes. The chancellor of the university in 1915 was Clark A. Fulmer.

NEBRIJA, nā-brē'hä, or **LEBRIJA,** lā-brē'hä, ANTONIO DE (1444–1522). An eminent Spanish humanist, whose real name was Antonio Martínez de Jarava. From the city of his birth (Nebrija, or Lebrija) he became known as Antonio Nebrissensis. One of the most important leaders of the revival of learning in Spain, he was tutor to Queen Isabella, collaborator with Cardinal Ximenes on the celebrated Complutensian Polyglot Bible, and professor for

many years at the University of Alcalá. His works may be classified as philological, poetical, historical, juridical, medical, and theological. Aside from his chronicle of the reigns of Ferdinand and Isabella, his most important works are the *Dictionarium Latino Hispanicum et Hispanico Latinum* and the *Gramática sobre la lengua castellana*, both published in 1492, when there were no similar works in any other modern language.

NEBRIS, nĕb′rĭs. See DIONYSUS.

NEBRIS'SA VENE'RIA. See LEBRIJA.

NEBUCHADNEZZAR, nĕb′û-kăd-nĕz′zēr, or, more correctly, **NEBUCHADREZZAR** (Heb., from Bab. *Nabu-kudŭrri-uṣur*, Nabu [Nebo], protect the boundary). The great King of the Chaldæan Empire, who ruled 605–562 B.C. He was the second of the name, Nebuchadnezzar I having been a distinguished monarch of the fourth dynasty of Babylon, reigning c.1160–1140 B.C. He was the son of Nabopolassar, Viceroy of Assyria in Babylonia, who, after the death of Asurbanipal, gained control of the Babylonian portion of the latter's empire in 625 B.C. The family was Chaldæan, hence the use of this name for the dynasty and for the land in later ages. (See CHALDÆANS.) Nabopolassar entered into alliance with the other great enemy of Assyria, the Medes, marrying his son to a daughter of the Median King Cyaxares, and apparently also with Psammetichus of Egypt. Nineveh was saved in 625 by the appearance of Assyria's ally, the Scythian King Madyas, who drove away the Medes. But a second attack by the Medes, supported no doubt by the Chaldæans, led to the fall of Nineveh in 606 B.C. The Assyrian Empire was forthwith partitioned; the Medes took possession of the upper Tigris valley and the lands to the north and east of the Euphrates; Nabopolassar made firm his control of the Euphrates valley; and from the west Necho, King of Egypt, advanced to the great river to reclaim for his land its ancient dominion in Syria. The division of spoils between Media and Babylon seems to have been prearranged, but Egypt's intrusion could not be suffered, and Nabopolassar sent Nebuchadnezzar against Necho. The latter seems to have been defeated at Carchemish (605 B.C.). But he was recalled by the news of the death of his father. Unfortunately we possess but scanty materials for the study of the continuation of Nebuchadnezzar's military and political career. The sources are, besides a few inscriptions, the partial accounts found in the Bible, Josephus (quoting Berosus; *Ant.*, x, 6–11, c. *Ap.*, i, 21), and Herodotus (containing obscure information concerning Egypt; ii, 151 et seq.) and a fragment of Menander. The books of Kings, Jeremiah, and Ezekiel enable us to follow to some extent Judah's relation to its new lord. At first King Jehoiakim submitted, but about 600 B.C. rebelled. After some delay Nebuchadnezzar sent his army against Jerusalem, which fell in 597, Jehoiakim dying during the siege. His son, Jehoiachin, suffered the Imperial chastisement of exile along with 10,000 citizens, an uncle, Zedekiah, being appointed to the throne by the conqueror. But the new King succumbed at last to the temptations to revolt offered by his neighbors, especially by Hophra (see APRIES), the ambitious King of Egypt, and drew upon himself the wrath of the great King. Jerusalem stood a siege of 16 months, but fell in 586 B.C. Zedekiah was blinded, the city was in part destroyed, almost 4000 Jews were carried away into exile and a smaller number in 581 B.C. (See JEWS.) This campaign broke the refractory spirit of the Syrian states, Tyre alone holding out and suffering a famous siege of 13 years, which ended in a truce and the rather ignominious departure of the Chaldæan army, which had labored in vain outside its walls. In 568 B.C. occurred a campaign which carried Nebuchadnezzar into the heart of Egypt, where, however, he obtained no permanent results. But it is the glory of this King that he prided himself not on the arts of war (he seems to have prosecuted them only at necessity), but on his works of peace. Most of his inscriptions are devoted to his building operations, especially in Babylon, which, destroyed as it had been by Sennacherib and since then racked by civil war, he rebuilt and restored to more than its pristine glory. The excavations of the Germans under Dr. Koldewey have uncovered the extent and grandeur of the fortifications, the palace, the temple of Marduk, and the great Procession Street, which Nebuchadnezzar reared out of patriotism and an eminent devotion to the gods. The sister city Borsippa shared in his benefactions, and he built or repaired temples in Sippara, Cutha, Uruk, Larsa, Ur, and other cities. Nebuchadnezzar's outward successes seem to have been based upon noble kingly qualities. His son Amil Marduk (see EVIL MERODACH) succeeded him, but was assassinated after a reign of two years (562–560). He was followed by his brother-in-law, Nergalsharuṣur (Neriglissor), the son of Belshumishkun (560–556). Labashi Marduk, his son and successor, was murdered after only nine months' reign. He was the last descendant of Nebuchadnezzar who sat upon the throne, Nabonidus (q.v.), the last King of Babylon, being a native Babylonian and not a Chaldæan. For Nebuchadnezzar's inscriptions, consult: Ball, in the *Proceedings of the Society for Biblical Archæology*, vols. x–xi (London, 1888–89); H. Winckler, *Keilinschriftliche Bibliothek*, vol. iii, part ii (Berlin, 1892); Langdon, *Building Inscriptions of the Neo-Babylonian Empire* (Paris, 1905); id., *Neobabylonische Königsinschriften* (Leipzig, 1912). For excavations in Babylon, consult Koldewey, in *Mittheilungen der deutschen Orient-Gesellschaft* (Berlin, 1899–1913), and id., *Das Wiedererstehende Babylon* (Leipzig, 1913). See also BABYLONIA and the literature quoted under that article.

NEB′ULA, IN MEDICINE. See LEUCOMA.

NEB′ULÆ (Lat. nom. pl., clouds, vapors, mists). Patches of luminous matter occurring in considerable numbers in various parts of the sky and differing from the stars in that they do not present simply small definite points of light, but rather large surfaces of widely varying brilliancy. We have acquired much exact knowledge about the nebulæ, especially in recent years, since the application of photographic processes to astronomical observation; and they have also been made the subject of extensive philosophical theories as to the origin, development, and construction of the universe, some of which are based upon too many hypothetical considerations to receive the unqualified assent of astronomers.

Only two nebulæ are visible to the naked eye: that in Andromeda and the great nebula in Orion. The former consists of an oval mass

of light about three times as long as it is broad and surrounded with several more or less distinct disconnected oval rings. There is also a central condensation in the middle of the whole mass. The Orion nebula, on the other hand, is of quite irregular shape, contains a number of stars, and is indented with at least one very large nonluminous break known as the fish mouth. Both these large nebulæ, in the telescopic field of view, cover a space of more than one square degree on the sky's surface. When tested by long-exposure photographs, they are found to be of truly gigantic size. It is now admitted that the entire constellation of Orion is included in the outlying parts of the great nebula. Condensations appear to fasten about the stars of the constellation; and indeed the conclusion seems irresistible that we are looking upon a universe in course of formation out of plastic and gaseous material. Many of the less conspicuous nebulæ are round or oval, often have a stellar central condensation, and sometimes one of a disklike form with uniform surface luminosity. These are the so-called planetary nebulæ. Then there are annular, or ring-shaped, nebulæ and spiral nebulæ. These last look like great whirlpools of matter apparently rotating rapidly and trailing long streamers of light. The very latest results in nebular photography seem to indicate that the spiral form is in fact the most prevalent one. The application of the spectroscope, and especially the spectrograph, to nebular study has proved that many nebulæ are really gaseous in constitution and not simply aggregations of stars too small and close together to be separated even by our most powerful telescopes. It has also been possible to measure with the spectroscope the velocity with which some of the nebulæ are moving through space in the direction of our solar system, and it is found that nebular velocities are of about the same order of magnitude as those observed in the case of ordinary stars. As to the changes of the shape and form of individual nebulæ, we have no decisive evidence. Indeed, the outlines of these objects are so hazy that no reliance can be placed upon ordinary drawings, and even photographs can mislead us, since what we see upon them depends in great measure upon the length of time during which the sensitive plate was exposed to the light of the nebula. The number of the nebulæ at present known is not far from 10,000, and the best catalogue of them is by Dreyer, published in the *Memoirs* of the Royal Astronomical Society of London.

As to their distance, our knowledge is still in the conjectural stage. No one has yet measured a nebular parallax (see PARALLAX) successfully, but it is extremely probable that their distances, like their velocities of motion, are of the same order of magnitude as the corresponding quantities for the fixed stars.

The theory of cosmic evolution known as the nebular hypothesis of Laplace aims to account for the origin and development of our solar system, beginning with a presupposed mass of formless matter. This mass, assuming a rotation under the influence of natural forces, might be expected to take upon itself the form of a flattened sphere; and if a contraction of its bulk should occur after the lapse of ages of time, certain rings of matter might be left behind, as it were, by the contracting mass. Such rings have indeed a certain analogy in the Andromeda nebula, and, their possible formation once granted, there is nothing to prevent the gradual breaking up of a ring under the action of gravitational forces. Its matter might then be gathered into a single ball, and thus would be formed a planet circulating in an orbit around the central condensing mass destined in later ages to form the sun itself. It will be seen that this hypothesis, while plausible, rests upon a basis of imagined possibilities rather than ascertained facts. While, therefore, it is most interesting, it must on no account be reckoned among those astronomical theories (such as gravitation) whose foundation is as strong as that underlying any of the scientific truths coming within the range of human knowledge. See ASTRONOMY; COSMOGONY.

Consult Isaac Roberts, *A Selection of Photographs of Stars, Star Clusters, and Nebulæ* (2 vols., London, 1894–1900), and A. M. Clarke, *The System of the Stars* (2d ed., ib., 1905).

NEBULAR HYPOTHESIS. See COSMOGONY; NEBULÆ.

NEB'ULY, or **NEBULE** (Fr. *nébulé*, from OF. *nebule*, cloud, from Lat. *nebula*, Gk. *νεφέλη, nephelē*, Skt. *nabhas*, OChurch Slav. *nébo*, cloud). One of the partition lines in heraldry (q.v.), which are intended to represent the clouds and hence are drawn horizontally.

NECCI. See CHESTNUT.

NECESSARIES (Lat. *necessarius*, requisite, indispensable, from *necesse*, OLat. *necessum*, indispensable, from *ne*, not + *cessus*, pp. of *cedere*, to yield). In its technical legal sense, such articles as are reasonably suitable or necessary to maintain a person in the condition in life which he occupies at the time they are furnished. The use of the term in this sense resulted from the doctrine of the common law that married women, infants, lunatics, or any incompetent persons cannot be held on their contracts; and in order to obviate the harsh effect of this rule, the courts adopted the policy of holding such persons for any articles furnished them which were actually necessary to sustain life. The courts continued the use of the word "necessary," but have extended its legal meaning until to-day it is a very elastic term. It is not limited only to food and clothing sufficient to sustain life, but may include articles which might be considered luxuries by persons in some stations in life, according to the circumstances of the case. In order to determine whether an article is a necessary, the character of the article itself, the use for which it was designed, the age, social position, wealth, and previous mode of living of the person to whom it was furnished must be considered. These are questions of fact and must, therefore, be submitted to a jury. See BANKRUPTCY; CONTRACT; HUSBAND AND WIFE; INFANT; LUNATIC; and consult authorities referred to under CONTRACT, ETC.

NECHES, nĕch'ĕz. A river of eastern Texas, rising in Van Zandt County and flowing southeast into Sabine Lake, whence its waters, with those of the Sabine River, find their way by Sabine Pass into the Gulf of Mexico (Map: Texas, E 4). It is about 350 miles long and waters a wide and fertile portion of Texas.

NECHO, nē'kō (Egypt. *Nekau*). The second King of the twenty-sixth Egyptian dynasty, called Pharaoh-nechoh in the Bible (2 Kings xxiii. 29 et seq.) and Nechos, Nechaus, etc., by

Greek writers. He succeeded Psammetichus I and reigned from 610 to 594 B.C. On the downfall of the Assyrian Empire, Necho attempted to gain possession of Syria (Breasted, 609) and, at the outset of his campaign, defeated and slew Josiah, King of Judah, who opposed him at Megiddo. Jehoahaz, the son of Josiah, after a brief reign of three months, was deposed by the Egyptians. Eliakim, who changed his name to Jehoiakim, was made King by Necho in place of Jehoahaz, and Judah was subjected to a tribute of 100 talents of silver and one of gold. Necho conquered Syria as far as the Euphrates, but was completely defeated at Carchemish by the Babylonian Crown Prince Nebuchadnezzar (605 B.C.) and lost all his conquests. Although unable to cope with the Babylonian Empire, Necho was an active and energetic ruler. He unsuccessfully attempted to construct a canal from the eastern arm of the Nile to the Red Sea, a precursor of the modern Suez Canal. Necho also built a fleet and sent it, manned by Phœnician sailors, on an exploring expedition around Africa. Consult: Alfred Wiedemann, *Geschichte Aegyptens von Psammetich I. bis auf Alexander den Grossen* (Leipzig, 1880); E. A. T. Wallis Budge, *A History of Egypt* (New York, 1902); J. H. Breasted, *A History of the Ancient Egyptians* (ib., 1908).

NECK (AS. *hnecca*, OHG. *hnac, nac*, Ger. *Nacken*, neck; probably connected with OIr. *cnocc*, OBret. *cnoch*, hill, elevation). The portion of the anatomy between the head and the shoulders. In the human being there are several muscles that pass from the skull to the thorax, which, together with the œsophagus and the trachea, form the principal bulk of the neck. Through the neck run very important blood vessels between the brain and the thorax, among these being the carotid arteries and the jugular veins, accidental cutting of either of which usually causes death very promptly. Through the œsophagus the food passes into the stomach, and through the trachea the air passes into the bronchi and thence into the lungs. The principal muscles of the neck are the platysma myoides, the sternocleidomastoid, the infrahyoid and suprahyoid, the muscles of the tongue, the muscles of the palate and of the pharynx, and the prevertebral muscles, as well as certain of the muscles of the back which are inserted into the skull, as the trachelomastoid, complexus, transversalis cervicis, the rectus group, the longus colli, the three scaleni, and the cervicalis ascendens. Several of these muscles form important triangles with the aid of the ramus of the jaw, the clavicle, the hyoid bone, and the imaginary centre line of the body. These triangles are of use to the surgeon in locating and describing important structures. For instance, the digastric triangle is bounded by the jaw, above, and on either side by a belly of the digastric muscle, attached (at the apex of the triangle) to the hyoid bone below. Within this triangle lie portions of the facial and lingual arteries, and it is the site chosen for ligating the last-named artery.

In man there is present at the back of the neck a rudiment of an important elastic ligament which in some of the lower animals serves to sustain the weight of the head. It is called the ligamentum nuchæ and is a yellow elastic ligament which represents in the neck the supraspinous and interspinous ligaments of the vertebræ of the lower part of the spine. It extends from the external occipital protuberance to the spinous process of the seventh cervical vertebra. In front and on either side of the trachea lie the two lobes of the thyroid gland. The accessory thyroid glands are in close relation to it, and below, in children, is found the thymus.

NECK'AM, Alexander (1157–1217). An English Latinist, born at St. Albans, Hertfordshire, foster brother of King Richard I. Neckam studied in Paris and in 1180, or before, became a lecturer at the university there. In 1186 he returned to England and later entered an Augustinian monastery at St. Albans, where he did most of his writing. He wrote, on natural science, a prose essay, *De Naturis Rerum*, and *De Laudibus Divinæ Sapientiæ*, a treatment of the same subject in elegiac verse (both edited by Thomas Wright in the "Rolls Series of Chronicles and Memorials," 1863); also 42 fables. The fables are edited and Neckam's life sketched by Hervieux, *Les fabulistes latins* (3 vols., Paris, 1883–93). The *De Naturis Rerum*, a résumé of the scientific knowledge of the time, deals much with nautical matters; in particular it preserves the earliest European reference to the use of the magnetic needle as a guide to seamen (see page 183 of Wright's edition).

NECKAR, nĕk'kär. One of the principal right affluents of the Rhine. It rises in the Swabian Jura in the southwestern part of Württemberg, near the source of the Danube, flows northward through Württemberg, then west through Baden, and enters the Rhine at Mannheim, 30 miles south of the mouth of the Main (Map: Germany, C 4). It is 247 miles long and flows for the greater part of its course through a series of lake basins surrounded by vine-clad hills. It is navigable for small steamers to Heilbronn, 71 miles; for smaller vessels to Cannstatt, 116 miles; and for rafts to Rottweil. Heidelberg lies on its banks near its mouth, where the river is flanked by picturesque hills crowned by ruined castles. It is greatly used for floating timber.

NECKER, nā'kâr', Jacques (1732–1804). A French statesman and financier. He was born Sept. 30, 1732, at Geneva, where his father was professor of public law. In 1747 Necker went to Paris and entered a banking house, where he served his apprenticeship in finance. In 1762 he established a banking business of his own in Paris and acquired a large fortune during the Seven Years' War. After retiring from business he became the representative of Geneva at the French court and also a syndic of the French East India Company. He likewise began his career as a writer and in 1773 gained the prize at the French Academy by his *éloge* on Colbert. He acquired a further reputation by his publications on political economy and finance, particularly his *Essai sur la législation et le commerce des grains* (Paris, 1775). On the removal of Turgot from office in June, 1776, Necker was called to assist in financial affairs, and after the brief administration of Clugny he was made Director General of Finances in June, 1777. Necker succeeded in restoring to some degree of order the general financial affairs of the country, though mainly by the perilous expedient of borrowing, which he was enabled to do to an almost unlimited extent, owing to the confidence reposed in his financial dexterity. He reformed and systematized the financial administration, made taxation more

equitable, and restored public confidence in the government. This was the most brilliant period of his life, and the salon of Madame Necker was the rendezvous for all the brilliant literary and political lights of the day. Necker's Protestantism, however, his extraordinary vanity, and some retrenchments which he had made in the royal household, together with his publication on the financial affairs of France, *Compte rendu au roi* (1781), made him an object of great dislike to both Queen and court, and on May 12, 1781, he was suddenly dismissed. He retired to Geneva, and while living in retirement on his estate of Coppet he wrote his famous *Administration des finances*, published in 1784. He returned to Paris in 1787, but was soon banished on account of an attack which he published on the financial policy and management of Calonne. In the financial crises which followed upon the administration of Loménie de Brienne, Louis XVI found himself under the necessity of calling Necker to the office of Director General of Finances and Minister of State. This was in the summer of 1788, and Necker recommended the calling of the States-General and thereby acquired his great popularity. When the court, on June 23, 1789, determined upon nullifying the resolutions of the Third Estate, Necker seemingly objected, and the King dismissed him on July 11 and required him to leave the French dominions. He obeyed, but the disturbances of July 12–14, culminating in the storming of the Bastile, were the result of his dismissal, and the King was under the necessity of recalling him. On the rejection by the Constituent Assembly of his scheme of a loan and the adoption instead of it of Mirabeau's scheme of assignats he resigned his office in September, 1790, and again retired to Coppet, where he died, April 9, 1804. Necker was able and honest, but he was a business man rather than a statesman. His daughter was the celebrated Madame de Staël (q.v.). A complete edition of Necker's writings, edited by his grandson, August de Staël-Holstein, was published in 15 volumes (1820–21). Consult: Madame de Staël, *La vie privée de M. Necker* (Paris, 1804); J. F. Nourrisson, *Trois révolutionnaires: Turgot, Necker et Bailly* (2d ed., ib., 1886); J. Hermann, *Zur Geschichte der Familie Necker* (Berlin, 1886); Charles Gomel, *Les causes financières de la révolution française: les ministères de Turgot et de Necker* (Paris, 1892).

NECKER, SUZANNE, *née* CURCHOD (1739–94). The wife of Jacques Necker (q.v.), born at Crassier in the Swiss Canton of Vaud. Her father, a Protestant minister, gave her an excellent education. She was at one time engaged to Gibbon, the historian, but after her father's death she went to Paris and there met Necker, then a wealthy banker, who married her in 1764. Under her influence Necker entered public life and became the Finance Minister of Louis XVI. She herself founded a hospital in Paris (1778), which still bears her name, and she wrote a number of books, including: *Des inhumations précipitées* (1790); *Réflexions sur le divorce* (1794; new ed., 1881); and five volumes of miscellanies, which appeared after her death (1798, 1802). Consult: G. P. d'Haussonville, *Le salon de Madame Necker* (Paris, 1882; Eng. trans. by H. M. Trollope, 2 vols., London, 1882); D'Arvor, *Madame Necker, 1737–94* (ib., 1897); Mark Gambier-Parry, *Madame Necker, her Family and her Friends* (Edinburgh, 1913).

NECKER DE SAUSSURE, de sō'sur', ALBERTINE ADRIENNE (1766–1846). A French writer, born in Geneva. She was the daughter of the naturalist Saussure and married Jacques Necker the botanist and nephew of the French statesman of the same name. Her cousin, Madame de Staël, was credited with the translation (1814) of Schlegel's *Vorlesungen über dramatische Kunst und Litteratur* (1809–11), now known to have been written by Madame Necker herself. The book on which her reputation rests is *L'Education progressive, ou étude sur le cours de la vie* (1828–32), for which the Academy gave her the Montyon prize in 1832. It treats of the importance of child training, in the preparation for later life, and of the education of women. Part of the work was translated by Miss Willard and Miss Phelps (Boston, 1835).

NECKING, NECK MOLDING. The molding or astragal (q.v.) at the junction of the capital and shaft of a column is often called the neck molding, while the plain space between the astragal of the shaft and the echinus in capitals of the Doric (and sometimes of the Ionic) type is called the neck or necking. See COLUMN; ORDERS OF ARCHITECTURE.

NEC'ROMAN'CY (Lat. *necromantia*, from Gk. *νεκρομαντεία*, *nekromanteia*, from *νεκρός*, *nekros*, corpse + *μαντεία*, *manteia*, divination). A method of divination by which the dead were supposed to be conjured up and to answer questions concerning the future. Its practice was certainly extremely ancient. It was condemned in the Old Testament. Among the Greeks it was familiar in Homer's day. In historical days necromancy was practiced by priests or consecrated persons at many shrines in Greece. It was also current among the Romans, although banned by the Church under Constantine. It was also employed by the Northern peoples and in the mediæval and later period passed over into sorcery. See DIVINATION; SPIRITUALISM.

NECROP'OLIS (Neo-Lat., from Gk. *νεκρόπολις*, *nekropolis*, cemetery, from *νεκρός*, *nekros*, corpse + *πόλις*, *polis*, city). A term originally applied to the cemeteries in the vicinity of ancient cities and in particular to a suburb of Alexandria largely devoted to the reception and embalming of the dead. The term "necropolis" is now, however, used in a much more extended sense and applied to any extensive burial region of ancient date. The most remarkable of these are in Egypt, where they extend for miles along the left bank of the Nile. The pyramids are the most conspicuous features of the Ghizeh necropolis. At Thebes the entire west bank of the Nile was a vast necropolis of the pharaohs, with mortuary temples, endless dwellings for the priests, schools, libraries, etc., the tombs proper being in the neighboring Valley of the Kings. Other famous necropolises in Egypt were at El Kab, Beni Hassan, and Abydos. In Africa the extensive necropolis of Cyrene; in Italy the ancient Etruscan tomb groups of Vulci, Tarquinii, and Capua, distinguished for their painted tombs; the remarkable necropolises of Myra and Antiphellus in Lycia, and that of Petra in Syria are among the important examples belonging to classical antiquity. The extraordinary collection of domed and minareted tombs and sepulchral mosques in Cairo, known as the Karafah (tombs of the caliphs) and

dating from the twelfth to the fifteenth century, is often and justly called a necropolis; but the term is seldom applied to either mediæval or modern cemeteries. The burial places of antiquity have been especially important sources of archæological discovery, owing to the universal custom in early ages of burying, with the deceased, utensils, arms, money, and jewelry for his use in the nether world. See BURIAL; CEMETERY.

NECRO'SIS (Lat., from Gk. *νέκρωσις, nekrōsis*, a killing, deadness, from *νεκροῦν, nekroun*, to kill, from *νεκρός, nekros*, corpse). A term employed to denote the absolute death of a circumscribed portion of any tissue. Specifically, in surgery, it is applied to the death of a bone wholly or in part. The dead portion separates from the surrounding healthy tissue by an inflammatory process, the cast-off part being known as the sequestrum and the boundary between the living and dead tissue as the line of demarcation. Bony necrosis is due usually to direct injuries, inflammations, and infections, which attack either the periosteum (the membrane covering the bone) or the marrow, the immediate cause being interference with the circulation and nutrition. Necrosis of the soft parts is termed gangrene, and the dead portion, known as the slough or sphacelus, separates in the same way as in bone, by a line of demarcation. Necrobiosis is the gradual death of the histological tissue elements, due to imperfect nutrition. It is a much slower process than necrosis. See GANGRENE.

NECTAN'EBO, or NECTAN'EBUS. The name of two kings of Egypt. NECTANEBO I (Egypt. *Nakht-Hor-hebt*), the Νεκτανέβης (*Nektanebēs*) of Manetho, was the first King of the thirtieth dynasty and reigned from 382 to 364 B.C. The native monuments give little historical information in regard to his reign, but the accounts of Greek writers, especially Diodorus, show that he was a capable and energetic monarch. In the earlier part of his reign he supported Evagoras, King of Cyprus, against the Persians and, when the latter invaded Egypt, succeeded in repelling them, aided by an inundation of the Nile. Nectanebo endeavored to restore the old sanctuaries of the land, and he built or restored temples in many parts of Egypt. His stone sarcophagus, inscribed with religious texts, is in the British Museum. He was succeeded by TEHER or TACHUS, after whom NECTANEBO II (Egypt. *Nakht-nebof*), the Νεκτανεβός (*Nektanebos*) of Manetho, reigned from 361 to 343 B.C. He was a great builder. For a long time he repulsed the attempts of the Persians to conquer Egypt, but they finally made themselves masters of the delta, and Nectanebo fled to Ethiopia. He was the last native King of Egypt. After his flight Egypt was subject to Persian rule until 332 B.C., when it came into the possession of Alexander the Great. Consult Alfred Wiedemann, *Geschichte Aegyptens von Psammetich I. bis auf Alexander den Grossen* (Leipzig, 1880), and E. A. T. Wallis Budge, *A History of Egypt* (New York, 1902).

NEC'TAR (Lat., from Gk. *νέκταρ, nektar*). In Greek mythology, originally identical with ambrosia (q.v.). From Homer's time, however, nectar is usually the drink of the gods, ambrosia their food; in some later writers nectar is the food and ambrosia the drink of the gods. In the *Iliad* only nectar is mentioned as the nourishment of the gods; in the *Iliad*, again, both ambrosia and nectar are used as unguents. Consult Roscher, *Nektar und Ambrosia* (Leipzig, 1883), though his identification of ambrosia and nectar with honey is open to grave doubts.

NECTAR. The sweet secretion formed by glands located on various parts of a plant, but especially in the flower. Sometimes it is called honey, but honey is nectar after partial digestion in the crop of insects, such as bees or wasps. See NECTARY; GLAND.

NECTARINE', -rēn'. A smooth-skinned variety of the peach. See PEACH, and Colored Plate of DRUPES.

NEC'TARY. A surface gland which secretes nectar (q.v.). The name is also applied to abortive floral organs (see below). Nectaries are most common in the flowers of seed plants, but are found also in regions remote from the flower (Fig. 1). Extrafloral nectaries are found on the leafstalks and at the base of the leaf blade, upon stipules and other portions of the leaf base, and more rarely upon the blade itself.

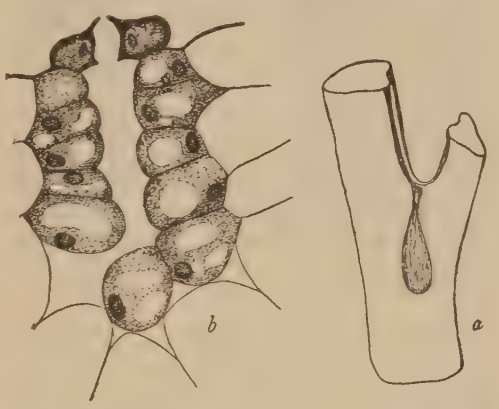


FIG. 1. EXTRAFLORAL NECTARY OF THE BRACKEN FERN.
a, diagram showing location of gland in the axil of a leaflet; *b*, section showing the secreting cells beneath a stoma. (After Lloyd.)

The forms of nectaries are very various. The secreting surface frequently covers a more or less pronounced swelling or cushion of tissue, which may develop on the base of the flower leaves or on the axis of the flower between them. Sometimes a nectary stands in the place where in other related flowers well-formed and functional floral organs stand. This fact has led to the application of the term "nectary" to abortive floral organs even when they do not secrete nectar. Sometimes the nectar gland forms a continuous ring about the base of the pistil. In other cases the nectar gland lines the concave surface of depressions in the floral organs or the floral axis. When these pits deepen, they con-

FIG. 2. SEPTAL NECTARY FROM FRUIT OF DAY LILY.
The columnar cells lining the tube are the secreting cells.

stitute efficient receptacles for the secreted nectar. Thus, spurred petals and sepals are often furnished with nectar glands on the inner side or at the base of the spur, and the whole cavity may become filled with their secretion. Nectar glands sometimes line deep and narrow pits of small capacity, opening at the surface by a pore or cleft from which the nectar oozes. These passages may be branches, so that a complex gland is formed, such as is found in the pistils of some lilies (Fig. 2).

Nectar varies greatly in composition in different plants. The greater part of it is water, which is withdrawn from the gland cells by the osmotic action of the sugar. (See SECRETION.) In addition to the sugars glucose and saccharose, various other carbon compounds and small amounts of proteids give the peculiar odor and flavor to the nectar. Nectar is eaten by bees, wasps, butterflies, and other insects, which in their search for it are utilized as unconscious carriers of pollen. See POLLINATION.

NEDBAL, nĕt'bäl, OSKAR (1874–). A Bohemian viola player, born at Tabor. He studied at the Prague Conservatory and became a viola player in the Bohemian String Quartet. He composed a *Scherzo-Caprice for Orchestra* and a *Sonata for Pianoforte and Violin.*

NEDHAM, MARCHAMONT. See NEEDHAM, MARCHAMONT.

NEDJED, nĕj"d. A region of Arabia. See NEJD.

NEED'FIRE. In folk custom, a fire kindled by the friction of two sticks of wood or of a rope on a wooden stake to ward off demons of disease. Among the many customs and beliefs connected with fire one of the most important is that of ritual purification. This idea arose at an early stage of man's acquaintance with fire from a simple observation of the effects of flame, the most mysterious phenomenon which he knew. Later fire was differentiated into a number of varieties partly good and partly evil with regard to position and use, thus implying that all flame was not equal in efficacy. Still further it was thought that by age or contamination fire became ineffective and must be renewed, hence the kindling of new fire, which was an accompaniment of widely diffused cults, as that of Thor in Scandinavia and of nature gods in ancient Mexico. The new fire is supposed to regenerate, as fire sacrifice is designed to sustain, the invisible beings. Needfire is a practice usually of shepherd peoples to ward off disease attacking the flocks. In historic times the sparks for kindling the needfire were sometimes obtained by twirling a wooden peg around in a wooden post. As in the case of new fire, the needfire was almost always accompanied with the extinguishing of the fires of the locality, and the neighbors also rekindled their fires from it as in the new fire ceremony. In practice the people passed or the herds were driven through or between the flames of the needfire for purification. The needfire custom survived well into the nineteenth century, and probably traces of it still exist in parts of Europe.

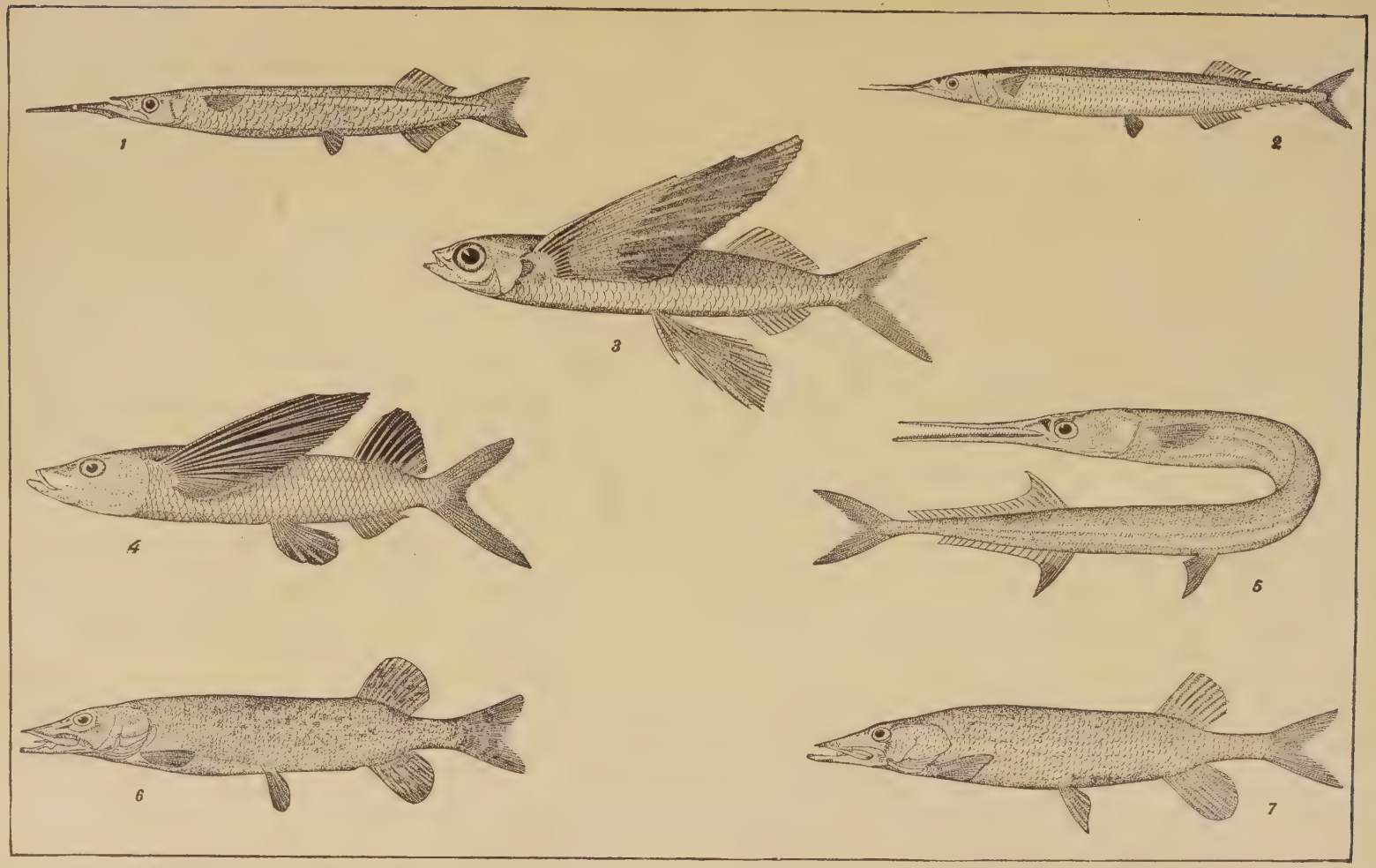
NEEDHAM, nēd'ăm. A town in Norfolk Co., Mass., 10 miles southwest of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 3). The most prominent buildings are the town hall and public library. The manufacture of knit goods constitutes the town's chief industry. Pop., 1900, 4016; 1910, 5026.

NEEDHAM, JOHN TURBERVILLE (1713–81). An English naturalist, born in London. He studied at Douai and was ordained to the Roman Catholic priesthood in 1738. Later he became director of the Academy of Maria Theresa at Brussels. Much interested in natural history, he contributed to the *Philosophical Transactions* of the Royal Society of London and was the first English Catholic clergyman to be elected a fellow of this society. His scientific work is of interest at the present time only in so far as it bore on the question of the reality of spontaneous generation. He thought that his experiments demonstrated that living beings may arise spontaneously from lifeless materials. These conclusions are published in his most important works, *Observations upon the General Composition and Decomposition of Animal and Vegetable Substances* (1749) and *Nouvelles observations microscopiques* (1750).

NEEDHAM, or **NEDHAM,** MARCHAMONT (1620–78). An English journalist and pamphleteer, born at Burford, Oxfordshire. He was educated at All Souls College, Oxford, and after studying medicine and law turned to journalism and founded in 1643 the *Mercurius Britannicus* (*sic*), to which he was frequently the sole contributor. The boldness of his scurrilous attacks upon Charles I led to his incarceration in the Fleet Prison in 1645 and in 1646, but the following year he became a Royalist himself and began the publication of *Mercurius Pragmaticus,* wherein he defended the King and turned his venomous pen against the Scots and Oliver Cromwell. Afterward he rejoined the popular party, and signalized his conversion by the publication of *The Case of the Commonwealth of England Stated* (1650). He became the editor of *Mercurius Politicus,* a weekly journal in which he again attacked the monarchy. After the Protector's death he went to Holland and continued the publication of his abusive pamphlets, such as *A Short History of the English Rebellion, Completed in Verse* (1661), and *Christianissimus Christianandus; or, Reasons for the Reduction of France to a More Christian State in Europe* (1678).

NEE'DLE (AS. *nædl,* Goth. *nēala,* OHG. *nādela, nādla,* Ger. *Nadel,* from OHG. *nājan,* Ger. *nähen,* to sew; ultimately connected with OIr. *snāthad,* thread, AS. *snear,* Eng. *snare,* Lat. *nere,* Gk. *νέειν, neein,* to sew). An instrument of metal, or other material, used to carry the thread in sewing, embroidering, knitting, netting, and other similar operations. Needles are generally made of metal, but bone, ivory, and wood are also used; for ordinary needlework, called sewing, they are made of fine steel, and are too well known to need description; for other kinds of work they are often much larger and differently formed. The earliest needles were not pierced, but were like awls, and were used for making holes in skins, through which the long roots of plants or leather thongs were passed. Later a hole was bored in one end of the stone or bronze needle, through which the root or thong was passed, and this was dragged through the leather as it was punched. Stone needles with a hole in the end opposite the point are found in the remains of the Stone age. Bone needles with eyes are found in the reindeer caves of France and lake dwellings of central Europe. The needles that have come down to us from ancient Egypt are very coarse, but finer needles must have been made to execute the delicate

NEEDLE-FISH, PIKES, ETC.



1. HALFBEAK (Hyporhamphus unifasciatus).
2. SAURY (Scomberesox saurus).
3. FLYING FISH (Exocœtus volitans).
4. SHARP-NOSED FLYING FISH (Fodiator acutus).
5. NEEDLE-FISH or HOUNDFISH (Tylosurus acus).
6. PIKE (Esox lucius).
7. POND PICKEREL (Esox reticulatus).

embroidery that was produced by that people. The ancient Greeks must have been skilled in needlework, judging from the descriptions of embroidery in Homer. Ordinary needles and surgeons' needles have been found in the ruins of Pompeii.

The Chinese are believed to have been the first to use needles of steel, and these implements gradually found their way westward until they were brought into Europe by the Moors. By 1370 the needle-making industry was established in Nuremberg. In England it was not until the reign of Queen Elizabeth that their manufacture was taken up on any considerable scale in small shops, and after 1650 it gradually developed until the manufacture of hand-sewing needles became an important industry in England, as also later in Germany. Subsequent developments included the introduction of the needle with the eye and the gradual development of machines for their manufacture. In 1785 the first mechanical process for producing the steel rod from which were formed two needles joined together was introduced. The first drill-eyed needles were made in 1826 by using a stamping machine, but it was not until about 1870 that needles were made for the most part mechanically, and not until after 1885 that they were also finished by machine.

The first operation, after the wire has been selected and its thickness accurately gauged, is to cut it into eight-foot lengths; this is done by winding it in a coil of 16 feet circumference and then cutting this coil into exact halves with powerful cutting shears. The coiling of the wire is so managed that there are 100 pieces in each half when cut; the bundles of 100 wires are again cut into the necessary lengths for two needles. The pieces cut from a coil, although now reduced to the length of two small needles, are nevertheless somewhat curved; they are therefore collected into bundles and placed in two iron rings, which hold them loosely together; they are then slightly softened by firing, and are laid on an iron plate or bench, and are pressed with a small curved bar in two or three positions, by which the operator manages to make them all perfectly straight. The blanks after being removed from a hopper in regular succession are next pointed at both ends by a grindstone to whose face they are held by a rubber band.

The eyes are next punched by means of dies. (See DIES AND DIE SINKING.) The blanks or double needles are now placed on two wires and the two sets broken apart to form separate needles. The roughly formed needles still have to be polished, tempered, and have the heads ground into shape, operations which are mechanically performed.

Besides the ordinary sewing needle already described and other hand needles—such as those used in sailmaking, leather work, upholstery, and surgery—many forms of sewing-machine needles are manufactured. The most familiar of these is the needle used in the domestic sewing machine, with the point in the eye and grooves on each side to protect the thread from being worn or cut in passing through the fabric. The latched needles used in stocking machinery are very delicate pieces of mechanism, as the latch is held by a rivet about $\frac{1}{100}$ inch in diameter between walls which are no thicker. For leather-sewing machines the needles must be adapted for use with waxed thread, and often are made with a hook at the end instead of a hole; while the welting-machine needle, for sewing welts in boots and shoes, is the shape of a segment of a circle.

Needles for use in various machines are made in the United States, especially those for the ordinary domestic sewing machine. At first these needles were made by processes similar to those employed for making ordinary hand-sewing needles, but gradually special machinery has been invented for their manufacture. The process is essentially as follows: The wire is cut into a blank, which is then reduced and pointed, grooved, has its eye punched, is hardened and tempered, hard burr dressed, brass brushed, has its eye polished, undergoes a first inspection, is hard straightened, and then receives the final pointing. In one method of making sewing-machine needles by machinery the crucible-steel wire from which the needle is formed is first straightened and then fed into a machine which makes the large end of the needle and cuts off the blanks of the lengths required. These blanks, after being ground and polished with emery wheels and an emery belt, pass from a hopper on to a grooved endless traveling carrier, where the shank of the needle is formed by the grinding action of an emery wheel. By successive wheels the needles are ground and pointed and then grooves are cut by steel saws and the eyes punched. They are then heated and hardened and cleaned, first by emery and then by wire brushes and burnishing powder applied from a bristle brush. The final pointing is done on a fine emery wheel, and the last polishing is accomplished with crocus and alcohol. A second method differs from that just described in that the steel wire is cut into blanks of about one-third the length of the finished needle. After a thorough cleaning these blanks are fed from a hopper into a machine where they are acted upon by steel dies which compress and extend the blank. This process is known as swaging and produces needles which vary slightly in length. This defect, however, is remedied by the action of a clipping and straightening machine which reduces the needles to a uniform size.

The total value of the various hand-sewing, darning, and shoe-machine needles imported into the United States was as follows: 1903, $442,887; 1904, $455,762; 1905, $406,261; 1906, $418,816; 1907, $492,637; 1908, $414,998; 1909, $431,147; 1910, $476,810; 1911, $445,081; 1912, $501,033; 1913, $49,694; 1914, $481,631. Consult article on "Needles and Pins," in *Twelfth Census of United States*, vol. x, *Manufactures*, part iv (Washington, 1902), and subsequent census bulletins and volumes on manufactures; also articles on the needle industry in *American Machinist*, vol. xxx (New York, 1907).

NEE'DLEFISH (so called from the shape of the snout). A garlike fish of the synentognathous family Esocidæ, and especially of the genus *Tylosurus*. They are slim, long-jawed voracious, carnivorous fishes, found in all warm seas, and sometimes entering rivers. Their habits are ordinarily much like those of a pike. (See Plate of NEEDLEFISH, PIKES, ETC.) Their flesh is good. Some species are numerous on the South Atlantic and Gulf coasts, where they are confounded with the true gars, under the names garfish and billfish (especially *Tylosurus marinus*), and are also called aguja (q.v.), longjaws, houndfish, and guardfish. Consult Jordan and Fordice, *Proceedings of the United States National Museum* for 1886 (Washington, 1887).

NEEDLE GUN. See SMALL ARMS.

NEEDLEWORK. See EMBROIDERY.

NEEF, nāf, or **NEEFS,** nāfs, PIETER, the Elder (c.1578–c.1661). A Dutch architectural painter. He was born at Antwerp and was there a pupil of Hendrick van Steenwyck. His numerous architectural paintings usually represent church interiors, frequently illuminated with the glow of torches or of candles. His treatment was delicate and refined, his knowledge of perspective extraordinarily accurate. Moreover, he understood the harmonious modulation of colors and the power of chiaroscuro, but he generally intrusted the painting of the figures introduced into his pictures to Teniers, Breughel, Van Thulden, Frans Francken, and others. His works are to be found in the galleries of Dresden, Vienna, Paris, Amsterdam, the Metropolitan Museum and the Historical Society, New York, and elsewhere. His son, Pieter the Younger (1620–75), painted similar subjects, and their works are frequently confounded.

NEELE, nēl, HENRY (1798–1828). An English writer, born in London. He was admitted to the bar and practiced as a solicitor. From the successful appearance of his *Odes and Other Poems* (1817), printed during his clerkship, he was a busy contributor to various journals and the annuals. In 1827 he gave, first at the Russell Institution and later at the Western Literary Institution, his *Lectures on English Poetry,* extending from Chaucer to Cowper. His most important publication was the *Romance of English History* (3 vols., 1827), a collection of stories based on occurrences in each reign from the Conquest to the Reformation, marred by a stilted style and historical inaccuracies. In the same year his poems were gathered in a two-volume edition. His verse has no higher qualities than spontaneity and ease. His stories, at their best, are marked by considerable imaginative skill. His *Literary Remains,* including the *Lectures,* appeared posthumously (1829), with a memoir. The *Winter Nights* (London, 1820) of Nathan Drake contains (no. xiii, vol. ii) "Critical Observations" on the *Odes and Other Poems,* associating Neele with Chatterton and Kirke White. At 30 he cut short his career by suicide.

NEENAH, nē'nà. A city in Winnebago Co., Wis., 13 miles north of Oshkosh, the county seat, on the Fox River, at the outlet of Lake Winnebago, and on the Chicago and Northwestern, the Chicago, Milwaukee, and St. Paul, and the Minneapolis, St. Paul, and Sault Ste. Marie railroads (Map: Wisconsin, E 4). It is an attractive summer resort, well known for its fishing, and has a public library, the Kimberly High School, Theda Clark Memorial Hospital, a handsome opera house, and several public parks, the most notable being Riverside Park. The river, which affords fine water power, divides, as it leaves the lake, into two streams, inclosing a large island, half of which belongs to Neenah and half to Menasha, the two cities forming practically one industrial community. Manufacturing enterprises are well developed and include paper, lumber, and flour mills, woodworking plants, knitting mills, creameries, stove works, foundries and machine shops, brickworks, a boot and shoe factory, etc. Large quantities of cheese and butter are shipped from Neenah. Settled in 1846, Neenah was incorporated in 1850 as a village, and in 1873 was chartered as a city. The government, under a charter of 1883, is administered by a mayor, chosen every two years, and a unicameral council. The municipality owns and operates the water works. Pop., 1900, 5954; 1910, 5734.

NEER, nār, AART VAN DER (1603–77). A Dutch landscape painter, the father of Eglon Hendrik van der Neer, born at Gorcum. He was a tavern keeper as well as a painter, and is thought to have studied under Camphuysen. His paintings frequently resemble those of his friend Albert Cuyp—for the most part moonlight scenes, depicted with a delicate warm tone. At times he represented the same scenes, usually towns or groups of cottages on the banks of a canal or river, in winter or at sunset in other seasons. Fine specimens of the latter kind are in the National Gallery, London, in the Hermitage, St. Petersburg, and in the Metropolitan Museum, New York, which also possesses a good night scene, "The Farrier." Van der Neer likewise painted remarkable conflagration effects, good examples of which are in the Schwerin Gallery and the Berlin Museum, which, besides a winter and a sunset scene, contains four effective moonlight pieces. Among the best of the latter variety are one in the Arenberg Gallery, Brussels, two in the Dresden Gallery, and several in the Wallace collection, London, which owns, besides, two of his finest winter landscapes. These may also be seen to advantage in the museums of Amsterdam and Brunswick and the collection of Lady Wantage. Van der Neer died at Amsterdam, Nov. 9, 1677.

NEER, EGLON HENDRIK VAN DER (1634–1703). A Dutch genre and landscape painter, born at Amsterdam. He was at first instructed by his father, Aart van der Neer, who, on his showing preference for figure painting, placed him under Jakob van Loo. At the age of 20 he went to France, where he spent about three years, then lived successively in Rotterdam, Amsterdam, and Brussels, and in 1690 became court painter to the Elector Palatine at Düsseldorf, where he died on May 3, 1703. His favorite subjects were interiors, the best being single figures, especially ladies in elegant attire, engaged in domestic occupations, in the manner of Terborch and Metsu. He is, however, inferior to these masters in technique, freedom of composition, and rendering of textures. Good examples of this kind are a "Lady Tuning her Lute" (1678), in the Pinakothek at Munich and similar subjects in the Rotterdam Museum (1669) and in the galleries at Karlsruhe (1677) and Dresden. Eglon van der Neer was also fond of heroic landscapes with biblical or mythological figures modeled after Elsheimer, such as "Tobias with the Angel," in the Amsterdam, Berlin, and Karlsruhe museums. His portraits are frequently mistaken for those of Kaspar Netcher.

NEERWINDEN, nār'wĭn'den. A village of Belgium, in the Province of Liége, 5 miles southeast of Tirlemont, celebrated in history for the great victory gained by the French under the Duke of Luxembourg over the English and Dutch under William III (July 29, 1693). (Map: Belgium, D 4.) It was also the scene of the defeat of the French under Dumouriez by the allies under the Prince of Coburg (March 18, 1793). It was occupied by the Germans in the European War which began in 1914.

NEES VON ESENBECK, nās fŏn ā'zen-bĕk, CHRISTIAN GOTTFRIED (1776–1858). A German botanist and naturalist. He was born at Erbach in the Odenwald, studied medicine at Jena, and in 1818 became professor of botany at the Uni-

versity of Erlangen. He subsequently was professor of botany at Bonn, and in 1830 accepted the posts of professor of botany and director of the botanic garden at Breslau. In 1848 he went to Berlin and took an active interest in the agitations of that and the following year. His deposition from the chair of botany in 1852 was the consequence of his political activity. In his *Handbook of Botany* (1821) he developed the theory advanced by Goethe in his *Metamorphose der Pflanzen*, that all the parts of the flower are only variations of the leaf. This work had been preceded by *Die Algen des süssen Wassers* (1814); by *Das System der Pilze und Schwämme* (1816); and by *Substanz der Pflanzen* (1819), in which he was assisted by Rothe and Bischof. He published, in 1833, *Genera et Species Asterearum;* in 1836, *Systema Laurinarum;* and in 1841, *Floræ Africæ Australiaris Illustrationes Monographicæ*. In 1852 appeared the first volume of *Die allgemeine Formenlehre der Natur*. He was a specialist on cryptogamous plants, and in this branch of botany his chief work is *Naturgeschichte der europäischen Lebermoose* (1833–38).

NE EX'EAT (Lat., let him not go out). A writ or order issued by a court of equity, directed to a sheriff and commanding him to arrest the defendant in an action and detain him until he furnishes a certain bail, on condition that he will not leave the jurisdiction without permission of the court. About the time of Queen Elizabeth this writ came to be employed by the Court of Chancery to restrain a person who was under some equitable obligation to another from leaving the country. This practice became common in England, and was adopted into equity or chancery practice in the United States, where it still obtains in many States.

This equitable remedy of *ne exeat* corresponds in its purposes to the legal process of arrest and bail in civil cases, and has been abolished by some modern codes of procedure, as in New York, and the legal remedy substituted in its stead. See ARREST; BAIL; EQUITY. Consult the authorities referred to under EQUITY; PROCEDURE; WRIT.

NEF, JOHN ULRIC (1862–1915). An American chemist, born at Herisau (Appenzell), Switzerland. He graduated at Harvard University in 1884, held a fellowship there in 1884–87, studied also at Munich (Ph.D., 1886), and in 1887–89 was professor of chemistry in Purdue University (Lafayette, Ind.). In 1889–92 he was assistant professor of chemistry and acting director of the chemical laboratory in Clark University (Worcester, Mass.), in 1892–96 was professor of chemistry in the University of Chicago, and in 1896 became head of the department of chemistry in that institution. He is known internationally as an original worker in organic chemistry. Among his contributions to this science may be mentioned his establishment of the constitution of fulminic acid and his theory that in many compounds and reactions carbon acts as a bivalent element. In 1915 the honorary degree of doctor of laws was conferred upon him by the University of Pittsburgh. His scientific papers were published in the *Annalen der Chemie*.

NEGAPATAM, nĕg'*a*-pa-tăm'. A seaport city on the Coromandel coast, in the district of Tanjore, Madras, British India, and the terminus of a branch line from Tanjore, 48 miles east of that town (Map: India, D 7). It has regular steamer communication with Ceylon, Burma, and the Straits Settlements, and carries on an active trade exporting rice, tobacco, cigars, hides, and paddy, and importing cotton goods, betel nuts, and camphor. The extraction of oil from coconuts and oil seeds is an important industry. The extensive construction and repair plant of the South Indian Railway is located here. Negapatam was one of the earliest Portuguese settlements on the Coromandel coast; it was taken by the Dutch in 1660, and was the capital of their Indian possessions until captured by the English in 1781. Pop., 1901, 57,190; 1911, 60,168.

NEG'ATIVE (from Lat. *negativus*, negative, from *negare*, to deny, from *nec*, not + *aierc*, Skt. *ah*, to say, Gk ἠμί, *ēmi*, I say). A photographic picture in which the lights and shades of the object are reversed. A negative is usually produced in a camera by the action of light upon the sensitized surface of a glass plate, celluloid film, or paper. (See PHOTOGRAPHY.) When the plate or film is developed, the portions most affected by the light receive the densest deposits and are rendered nearly if not quite opaque, while the portions corresponding to the shadows appear transparent. A good negative should show the gradations of light and shade and should be distinct in all its detail. The presence of as many tones, or values of light and shade, as possible is desired, while at the same time the high lights and shadows must be marked. The production of a good negative, outside of questions of the preparation of the plate or film, depends chiefly upon a proper length of exposure and successful development. A negative is used for making positives by contact printing or with an enlarging or copying camera. For contact printing the negative is placed film side upward in a printing frame, and on it is laid a sheet of sensitized paper with its coating next to the film. The printing frame is then exposed to the light, and the rays passing through the clear or transparent portions of the negative affect the paper beneath, while those portions beneath the dark or opaque parts of the negative are protected and remain white. In this way a large number of positives or correct reproductions can be obtained from one negative.

NEGATIVE CATALYSIS. See CATALYSIS.

NEGATIVE GEOTROPISM. See APOGEOTROPISM.

NEGATIVE HELIOTROPISM. See APHELIOTROPISM.

NEGATIVE HYDROTROPISM. See APHYDROTROPISM.

NEGATIVE QUANTITY. The inverse operations of mathematics, such as subtraction, division, and evolution, often lead to results which cannot be expressed in terms of the same unit as the numbers entering the operation. The interpretation of these results leads to the so-called artificial numbers and in the particular case of subtraction to the notion of negative number. For example, $2 — $3 is impossible if the result is to be expressed in terms of the positive unit $1, but, since the result of subtraction is the number which added to the subtrahend will produce the minuend, it is easy to see that the number which added to $3 will make $2 must be equivalent to the number which subtracted from $3 will make $2. In other words, instead of subtracting $1 from $3 to reduce it to $2, a number must be added which will produce the same result. Such a number is called

a negative number and is designated by the sign — placed before it. Hence $\$2 - \$3 = -\$1$. This notion of negative number as the opposite of positive number, and apparently growing out of an arbitrary interpretation of a mathematical process, has its counterpart in concrete magnitudes opposed in function or extent. For example, in the above case, if a man's assets are $2 and his debts $3, the number expressing his financial status is $1 of indebtedness, which may be expressed by — $1. Similarly, time A.D. is often expressed by positive numbers and time B.C. by negative numbers. In astronomy north latitude is expressed by positive numbers and south latitude by negative numbers; west longitude may be designated as positive and east longitude as negative, or vice versa. Such extensions of the meaning of signs and modes of operation are the natural outgrowths of a constantly progressive science. The introduction of the negative number doubles the number space of arithmetic by adding an infinite series of numbers opposite in meaning and having a 1 to 1 correspondence (see CORRESPONDENCE) with the series of positive numbers.

The negative quantity enters geometry through the phases of motion and direction. For example, the segments *AB*, *BC*, and *CD* of a horizontal straight line *AD* thought of as extending to the right are considered positive, but the segments *DC*, *CB*, and *BA* thought of as extending to the left are considered negative. Similarly, many writers regard all angles generated by a line revolving counterclockwise about a point as positive and those generated by a clockwise motion as negative. The introduction of negative quantities into geometry, especially in connection with the theory of continuity (see CONTINUITY), has greatly increased the power and scope of the subject.

The meaning of negative quantities as employed in the physical sciences may be illustrated from elementary mechanics. A material point confined to a horizontal straight line may move to the right, remain stationary, or move to the left. The first condition may be expressed by a positive velocity towards the right, the second by a zero velocity, and the third by a negative velocity.

By analogy to mathematical usage the positive and negative notation is sometimes applied to quantities measured by scales like those of the ordinary thermometers, on which an arbitrary point is denoted as the zero point, and all degrees below zero are denoted by negative numbers. Such conventional notations are convenient, but not always well founded. Thus, the temperature — 1° C. is not the physical opposite of + 1° C.; the two temperatures would be the physical opposites of each other only if 0° C. represented a state in which bodies would have no heat at all, and if it were possible that a body should have less than no heat. On the other hand, in the case of physical magnitudes whose character, like that of electricity, may be dual, the positive and negative notation has again a definite natural meaning.

Negative quantities have been thoroughly understood only within recent times. Although Hero of Alexandria in his *Stereometrica* considered the expression $\sqrt{81 - 144}$ as possible, the result is recorded as $8 - 1/16$, which shows that neither negative nor imaginary quantities were understood by the Greeks. Diophantus (c.275), however, recognized the difficulty, for he describes the equation $4 = 4x + 20$ as *ἄτοπος* (absurd), because the root could not be a natural number or a fraction. The Hindus were more successful, for Aryabhatta (c.530) distinguished between *dhana* (assets), positive quantities, and *kshaya* (liabilities), negative numbers. Bhaskara (c.1150) was aware that a square root can be both positive and negative, and that $\sqrt{-a}$ does not exist for the ordinary number system. Al Khuwarizmi (c.830), a celebrated mathematician under the Arab supremacy, obtained two roots for the quadratic equation, but the negative roots were rejected as not valid. Among the early European mathematicians Fibonacci (1202) went no further than the Arabs. Paccioli (1494) definitely stated the rule, *minus times minus always gives plus;* but this fact was known to the Arabs and Hindus—Bhaskara, e.g., having stated that the square of a negative number is always positive. Cardan (1545) recognized negative roots, but called them *æstimationes falsæ* or *fictæ*. Stifel (1544) called negative numbers *numeri absurdi*, and Harriot (1631) was the first to consider such a number capable of forming a member of an equation. Vieta (1591) distinguished between positive and negative numbers, and Descartes (1637) in his geometry used the same letter for both positive and negative quantities.

NEGAUNEE, nē-gâ′nē. A city in Marquette Co., Mich., 3 miles east of Ishpeming, on the Chicago and Northwestern, the Duluth, South Shore, and Atlantic, and the Lake Superior and Ishpeming railroads (Map: Michigan, B 2). It is in the great iron region of the State, on a ridge called the Iron Mountain, at an elevation of about 1400 feet, and has several productive iron mines within the municipal limits. It was at Negaunee that the first discovery of iron ore in the Lake Superior region was made. Negaunee's existence as a community dates from 1846; it was incorporated as a village in 1865 and as a city in 1873, the charter of that year, as revised, now operating to provide for a mayor, annually elected, and a unicameral council. The water works and electric-light plant are owned and operated by the city. Pop., 1900, 6935; 1910, 8460; 1914 (U. S. est.), 9108.

NE′GEB. (Heb., Egypt. *Ngb*, possibly connected with an Aram. root *negab*, to be dry, hence dry land, steppe). The name of a region in southern Palestine between the Arabah (q.v.) and the Mediterranean littoral and extending approximately from Hebron and Gaza in the north to a line running through Wadi Kades towards El Arish. As "towards Negeb" often is employed to indicate a southerly direction, it is translated "south" or "southland" in the English version; but the term Negeb should be used to avoid confusion. The earliest-known inhabitants of this district seem to have been Horites and Canaanites. The Hyksos movement is likely to have driven many ethnic elements into this territory, among them Hittite clans. The land of Negeb seems to be mentioned in an Egyptian inscription from the time of Thothmes III (1501–1447 B.C.). After the expulsion of the Hyksos from Egypt (c.1575 B.C.) Levi and Simeon appear to have occupied the centre of Negeb. Kadesh Barnea, the home of Moses (q.v.) and Miriam (q.v.), was at one time the chief city of the Levites. Beersheba, Bethuel (modern Halaza), Zephat (modern Meshrife), and Ziklag (modern Asluj) are mentioned as Simeonite cities. Levi and Simeon, however,

were overthrown and scattered, probably by the Idumæan Jerahmeelites first and then, after 1200 B.C., on the west by the Cherethites (Cretans). In the time of David (c. 1033–993) there were five distinct parts of the Negeb, viz., the Negeb of Judah, the Negeb of the Jerahmeelites, the Negeb of the Kenites (1 Sam. xxvii. 10), the Negeb of the Cherethites, and the Negeb of Caleb (1 Sam. xxx. 14). The Kenites dwelt farthest east near the Dead Sea and the Arabah; the Calebites lived in Hebron and its neighborhood; the tribe of Judah evidently held some places in the north; the Jerahmeelites had their cities in the centre; west of them Cretans and Philistines occupied a part of the Negeb; and the Amalekites were in possession of some places in the south and made raids so far as Ziklag. During the period of the Judæan Kingdom the various tribal elements were merged. After the exile the Edomites, driven out of Mount Seir by the Nabatæans, settled in the Negeb. Accustomed to city life, they no doubt developed those towns they took over from the Jews. The most flourishing period in the history of the Negeb seems to have been the time of the great Byzantine cities, whose ruins are still standing at Ruhaibeh, Sebaita, Meshrifeh, Saidiyeh, El Abdeh, El Aujeh, and Halaza. The dated Greek inscriptions found in a cemetery at Ruhaibeh and published by Schmidt and Charles in 1910 come from the fifth, sixth, and seventh centuries A.D. Greek civilization and Roman statecraft had made the desert places blossom like a garden; covered the valleys with grain and the terraced hills with vines; caused cities to grow, with beautiful streets and squares and walls, with temples and theatres, basilicas and churches, baths and aqueducts; and filled the land with a large and thrifty population. After the Arab conquest the cities declined and finally fell into ruins and became again a steppe land. It has been visited in recent times by some explorers, but has not yet been scientifically surveyed.

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NEGELEIN, nā'ge-līn, JULIUS VON (1872–). A German Oriental philologist, born at Königsberg. He was educated at the Gymnasium of Königsberg and at the universities of Greifswald, Berlin, Königsberg, and Marburg. After 1899 he was privatdocent at the University of Königsberg. Besides numerous contributions to learned reviews he published: *Das Verbalsystem des Atharvaveda* (1897); *Germanische Mythologie* (1906; 2d ed., 1912); *The Parašiṣtas of the Atharvaveda* (3 parts, 1909–10), with Bolling; *Der Traumschlüssel der Jagaddeva* (1912); *Atharvaprâyaščittâni* (1913–14).

NEGLIGENCE (Lat. *negligentia,* from *negligens,* pres.p. of *negligere, neglegere,* to neglect, from *nec,* not + *legere,* to gather). The omission to do something which a reasonable man guided by those considerations which ordinarily regulate the conduct of human affairs would do, or the doing something which such a prudent and reasonable man would not do. This definition assumes that the thing omitted or done was in violation of a legal duty, and resulted in legal damage to the one to whom the duty was owed. The three elements of negligence considered, then, are: (1) proper care; (2) legal duty; (3) legal injury.

1. It will be observed that the standard of care required by the definition is such as a reasonable man would exercise in a given situation. Whether such care has in fact been taken or not is generally a question of fact for the jury trying the question. It is true that if the evidence is not conflicting—if the story of the plaintiff is the same as that of the defendant, and if, in the opinion of the court, reasonable men could draw but one inference from the evidence—the question of negligence will be decided by the court. Hence a court often nonsuits a plaintiff on the ground that his own evidence shows that the harm of which he complains was not caused by any negligent act or omission of the defendant. As a rule, however, the jury are to determine whether the defendant's conduct was reasonably prudent or not. At the same time, the court is bound to explain to the jury the legal rules bearing upon the subject, of which the most important are these:

When a person undertakes the performance of a task which requires special skill, the failure to do all that any skillful person could reasonably be expected to do in such a case, considering all the circumstances, will amount to actionable negligence. If an ordinary mechanic undertakes to clean or repair a watch, he is bound to do the work with the skill and care of the ordinary watch cleaner or repairer.

The law does not presume negligence on the part of any one, and throws upon him who alleges that another has been negligent the burden of proving the fact. Accordingly, a person who has been injured by a runaway horse, or whose property has been destroyed by a fire which started on his neighbor's land, must show, not only that the horse ran away or the fire started, but that it was through the owner's fault. At times, however, the situation of the parties when injury occurs is such as to overcome the ordinary presumption of care on the part of the defendant. To such a situation the maxim is applied, *res ipsa loquitur*—"the thing speaks for itself." A railroad train jumps the tracks; a case of goods falls out of a warehouse window; or a peck of live cinders is thrown out of a railroad engine of an elevated road upon a traveler in the street below; in each case we have a situation which would not exist, ordinarily, had the railroad company or the warehouseman exercised ordinary care. Hence the presumption of due care on his part is overcome, and judgment will pass against him unless he can show that, notwithstanding these appearances, he was really without fault.

Another important rule is that the amount of care required varies with the apparent risk. One sets fire to brush or rubbish upon his premises and the fire spreads to his neighbor's land, doing damage and hurting another. Whether he acted negligently will depend upon various circumstances, such as these: Was the weather dry or damp? From what direction and with what velocity was the wind blowing? What

vigilance and effort did he exercise in trying to keep the fire on his own land? Again, without warning, one throws an article from a scaffold to the ground, hitting and hurting another. Whether he acted negligently will depend upon the apparent risk incident to the act. If the scaffold was adjoining a city street and the article was thrown into the thoroughfare, the act would be clearly negligent. On the other hand, if the scaffold overhung private premises, and there was no reason to believe that other persons were present, the act might well have been a reasonable one.

In some cases the courts are disposed to hold persons liable for harm caused by their acts or omissions, whether these are negligent or not. The doctrine was laid down by an eminent English judge as follows: "The person who for his own purpose brings on his land, and collects and keeps there, anything liable to do mischief if it escapes, must keep it at his peril, and, if he does not do so, is *prima facie* answerable for all the damage which is the natural consequence of its escape. He can excuse himself by showing that the escape was owing to the plaintiff's default, or was the consequence of the act of God." This view has not generally been adopted in the United States, the courts preferring the rule that one who brings dangerous agencies upon his land or under his control is not an insurer of the safety of others, but that he is bound to exercise a care over them commensurate with the apparent risk in each case.

The terms "gross negligence," "ordinary negligence," and "slight negligence" are often used, although the modern tendency is to discard them. When employed, the first represents the extreme of negligence—a want of care amounting almost to recklessness; the second is the absence of such care as an ordinarily prudent man exercises; and the third stands for the lack of care required of one who is doing a favor to the injured party, such as keeping his property gratuitously.

2. The legal duty of exercising care is relative, not absolute; when no duty to exercise care exists, there can be no such thing as negligence in the legal sense of the term. In other words, a man may be very careless without being negligent. To illustrate: the owner of a sugar orchard left a bucket of hot maple syrup uncovered in his woods. A neighbor's unruly cow jumped the fence, wandered into the wood lot, and died from drinking the sirup. Leaving the sirup thus was careless so far as protecting it from harm was concerned; but it was not negligence towards the owner of the cow, for the owner of the sirup was under no legal duty to exercise ordinary care towards trespassers, and the act of the cow was a trespass (q.v.). Towards trespassers the duty of a landowner, a common carrier, or the like, is simply to refrain from inflicting willful or wanton injury. Towards a licensee, i.e., one whom a person permits to be upon his premises or in his vehicle, the licensor owes some duty of care; but the amount of care is slight. As a rule, the licensee takes the risk of the situation. There must be something like fraud on the part of the licensor before he can be held answerable for injuries sustained by the licensee in falling into unguarded excavations, or breaking through defective floors, staircases, pavements, or the like, or getting caught by unfenced machinery, or being thrown from a collapsing carriage. The licensor is bound, however, not to open new excavations in or near a path which he knows licensees are accustomed to traverse, or to subject them to anything like mantraps or new and serious dangers without giving them warning. An ordinary guest is generally looked upon by the law as a mere licensee. Towards persons expressly or impliedly invited upon one's property in a matter of common interest, the inviter is under a well-defined duty—the duty of making the property reasonably safe. He is not under an absolute duty to prevent harm, but only to make the place as little dangerous as such a place would reasonably be, having regard to the ordinary exigencies of the business there carried on.

3. Even when it is shown that the defendant has been guilty of negligence towards the plaintiff, the latter may fail in his action because he cannot show that he has sustained legal harm by such negligence. A striking illustration of this rule is afforded where one is made sick by a nervous shock due to another's negligence. Through the fault of a railroad company, e.g., a car takes fire, and several passengers are so badly frightened that they faint and for weeks are confined to their beds by consequent sickness. According to the prevailing doctrine in England and in the United States, they have no cause of action against the company. Various reasons are assigned in its support. One is that such sickness is not the natural and probable consequence of the negligence; that it occurs only when there is an accidental or unusual combination of circumstances which could not have been reasonably anticipated by the defendant, and over which he had no control. Another reason urged is that to hold a defendant liable for mental anguish, or fright, or nervous shock, would cause an alarming increase in the volume of sham litigations. Every passenger in case of a railroad collision could allege fright or nervous shock and thus maintain an action against the company. In a few jurisdictions, however, mental anguish, even without consequent or attendant physical injury, is deemed legal damage. It is generally held that if the defendant's negligence causes injury to one's body, recovery may be had for the pain and suffering incident thereto.

Not only must the harm sustained by the plaintiff be of a character which the law deems it wise to recompense, but it must be, in contemplation of law, the natural and probable consequence of defendant's negligence. When negligence is to be deemed the proximate cause, and when the remote cause, is often a question of great difficulty. When the inquiry is sent to a jury, they are generally instructed that the proper test to be applied by them is: Was there an unbroken connection between the negligence and the injury? Did the facts constitute a continuous succession of events so linked together as to make a natural whole, or was there some new and independent cause intervening between the wrong and the injury? Applying this test, the plaintiff was beaten in the following case: Defendant, a railroad company, received a quantity of wool for transportation from Buffalo to Albany, N. Y., and for delivery there to another company for transportation to Boston, Mass. It was negligent in starting the wool on its journey, so that it

reached Albany 10 days later than it would but for such negligence. While in defendant's warehouse awaiting the call of the second carrier the wool was injured by an extraordinary flood. It was held that the immediate and proximate cause of plaintiff's loss was the flood, and that defendant's negligence was too remote to render it liable. The latter had ceased to operate as an active or efficient cause before the flood came.

It is on this ground (that defendant's negligence is not the proximate and efficient cause of one's injury) that the injured party is denied a recovery when he is shown to have been guilty of contributory negligence. A single example will suffice here: A workman is warned by his employer not to work upon a scaffold at a certain point because it has no railing there. He does work on that part and, forgetting the absence of a rail, steps backward, falls, and is injured. Clearly it is the workman's negligence, not the employer's, that is the decisive cause of his harm. But suppose, being there with knowledge of defendant's negligent omission of a railing, he had been knocked from the scaffold by the fall of an object from the roof, which fall was due to defendant's negligence. The servant's presence at the point in question would have furnished an opportunity for defendant's negligence to operate, but would not have been the cause of his injury, and he would recover.

Negligence which is the proximate and efficient cause of the death of a human being may subject one to a criminal prosecution for manslaughter, but at common law it does not render one liable in tort. The latter rule has been changed by statute both in England and in many of the United States. While this legislation varies in different jurisdictions, its principal object is to grant a cause of action on behalf of those who were dependent upon or financially interested in the life of the deceased against the one wrongfully causing his death. Consult: Shearman and Redfield, *Treatise on the Law of Negligence* (5th ed., New York, 1898); Pollock, *The Law of Torts* (7th ed., ib., 1904); E. B. Thomas, *Negligence* (2d ed., ib., 1904); S. D. Thompson, *Commentaries on Negligence* (7 vols., Indianapolis, 1905–07); Thomas Beven, *Negligence in Law* (3d ed., Toronto, 1908). See CAMPBELL'S (LORD) ACT; TORT.

NEGO'TIABLE IN'STRUMENTS (ML. *negotiabilis*, from Lat. *negotiari*, to negotiate, from *negotium*, business, from *nec*, not + *otium*, leisure). Contracts in writing which are transferable by indorsement or delivery, and which are enforceable by the transferee in his own name, without previous notice to the promisor, as well as without the risk of being met by defenses that would have been good against the transferor. Such contracts were unknown to the early common law of England. By that law a contract, whether written or oral, could not be transferred so as to enable the transferee to sue upon it in his own name. He was obliged to sue in the name of the transferor. Equity modified this rule to the extent of allowing an assignee of a contract to sue in his own name. But, even in equity, the assignment would not bind the promisor until he received notice of it, and after notice he could set up all defenses against the assignee which were available to him against the assignor at the time of notice. In other words, the assignee could get no better title than the assignor had. Modern statutes have made nearly all contracts of action assignable; i.e., they permit the assignee to sue upon them in his own name, but he takes them subject to the defenses available against his assignor.

The negotiability of certain contracts is a characteristic impressed upon them by the usages of merchants. This quality was first recognized and made effective by the law merchant (q.v.), whose rules were later adopted and enforced by the common law. Thus it has come about that for more than three centuries certain contracts in writing have been treated by all English judicial tribunals as negotiable, in contrast with others which are only assignable. The earliest form of negotiable instrument recognized by English law was the foreign bill of exchange (q.v.). Next in order came the domestic or inland bill of exchange, differing from the foreign bill only in the fact that it was drawn and payable within the same state or political jurisdiction. Following this came the promissory note (q.v.), but its negotiable character was not established without a struggle. It is true that the negotiability of this novel mercantile instrument passed unchallenged for a time in England, but after Lord Holt became Chief Justice he set his face against the recognition of new forms of negotiable instruments and decided that promissory notes were not negotiable. Immediately the merchants of London appealed to Parliament, which thereupon enacted a statute upholding the mercantile view and declaring promissory notes negotiable like bills of exchange (3 and 4 Anne, c. 9, 1704). About this time another species of negotiable instruments was devised and came into general use—the goldsmiths' or bankers' notes. These were the promissory notes of bankers, payable to bearer on demand, and originally given for money actually deposited with the maker by the one to whom they were issued. Lord Mansfield had no hesitation in treating them as negotiable by delivery. A little later the use of checks (see CHECK) became general. For some time the legal status of this instrument was doubtful, but it has long been recognized as a species of bill of exchange, and is now authoritatively defined as a bill of exchange drawn on a bank and payable on demand.

The foregoing are the most common forms of negotiable paper, but several other forms have been found useful in mercantile transactions and have received judicial approval, such as the bonds of business and municipal corporations, exchequer bills, and scrip for government bonds. In order that a written contract may possess negotiability, it must be payable to order or to bearer and must be treated in the money market as a security for and representative of money. Accordingly, bills of lading (see BILL OF LADING), warehouse receipts (see WAREHOUSE RECEIPT), and like documents of title are not negotiable instruments, even in jurisdictions where they are declared by statute to be negotiable. They are not representatives of money and cannot perform the functions of currency. They are symbols of goods, and their transferee gets no better title to the goods which they symbolize than he would secure by the delivery of the goods. Hence the thief or the finder of a bill of lading cannot pass a perfect title to a bona fide purchaser thereof, as he can do in case of a bill of exchange or a promissory note.

The right to enforce negotiable paper free from defenses available against the transferor or prior parties is confined to the bona fide holder, i.e., to one who has become the owner of the paper before it is due, for value, and without notice of any defect in the transferor's title. Such a holder can pass his title even after the paper is due, and to one who has notice of defects in the title of one back of such holder.

The law of negotiable instruments has been codified in Great Britain (Bills of Exchange Act, 1882, 45 and 46 Vict., c. 61) and in most of the United States.

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NEGOTIABLE PAPER. See NEGOTIABLE INSTRUMENTS.

NEGRI, nā'grē, ADA (1870–). An Italian poet, born at Lodi of a family of artisans. As a teacher in a village school, she wrote her first verses, which passed almost unnoticed in the columns of a periodical, but they attracted attention to her when published as the volume of lyrics entitled *Fatalità* (1893), which had a wide sale in Italy and was translated into German. A second volume, the *Tempeste*, appeared in 1896. Soon after the publication of the *Fatalità* she received a post in the normal school at Milan, where she married the manufacturer Garlanda. Her third collection of poems, *Maternità*, appeared in 1904. Ada Negri sings the song of the submerged classes. Her earlier verses have a Lombard fierceness of revolt lacking in her later writings. She depicts in vivid colors the abject misery of the workman engaged in a constant struggle against the cruel aristocrat, the ignoble bourgeois, and hostile nature. Although she idealizes the figure of the peasant or the artisan and is careless of form, her verse is characterized by spontaneity and sincere feeling. Consult Guido Mazzoni, in the *Nuova antologia* (Rome, 1893), and Jean Dornis, *La poésie italienne contemporaine* (Paris, 1898).

NEGRI, CRISTOFORO (1809–96). An Italian politician, historian, and geographer, born at Milan. He became professor at Padua in 1843, was the first member of the faculty to side with the Italian cause in 1848, and after Custozza and the success of Austria he was forced to resign his chair. He was almost immediately elected president of the University of Turin, and held a place in Gioberti's ministry until the battle of Novara. He then became chief of the consular service and held this position under Azeglio, Rattazzi, and Cavour. In 1867 Negri founded the Italian Geographical Society, and was its president for five years. He wrote: *La grandezza italiana* (1864); *La storia politica dell' antichità paragonata alla moderna* (1867); *I passati viaggi antartici e l' ideata spedizione italiana* (1880).

NEGRITOS, nā-grē'tōz (Sp., little negro). The term applied by most modern ethnologists to one of the great ethnic groups into which the population of the East Indies is divided. Some anthropologists recognize a Negritic stock consisting of three groups, Negrito, Papuan, and Melanesian, while others regard the Indo-Oceanic Negritos as a separate branch of the *Homo æthiopicus*, distinct from the Indo-Oceanic Negroes, from whom they believe that the Papuans and Melanesians have sprung. It seems best, however, to count the Malays, Indonesians, Negritos, and Papuans as the four ethnic stocks of Malaysia. The term should be used in the restricted sense implied in the principal recent classifications of mankind in this area. The physical characteristics of the Negritos are: small stature (great majority under 5 feet), a brachycephalic or subbrachycephalic head form, a dark-brown or black skin sometimes somewhat yellowish, the hair woolly (scanty on face and body), a flat nose, thickish lips, and other features of physiognomy and body of a negroid character. Many ethnologists assume that the earliest inhabitants of extreme southeastern Asia, the Malay Archipelago, and neighboring regions were of this stock, but evidence for such a view is lacking. No real proof of their presence in Sumatra, Java, Borneo, Celebes, or Formosa has been produced. It is held by some, however, that the Negritos once inhabited Timor, Flores, and the islands near, while it has been reported that the Karons of the Arfak Hills in northwestern New Guinea were Negritos, and an infusion of Negrito blood has been recognized in other parts of the island, such as the Saddle Mountain region. Definite proof of a predominantly Negrito people in New Guinea was supplied by the discovery of the Tapiro, of Netherlands New Guinea, by the Wollaston expedition (1910). The only centres of undoubted Negrito population existing at present are in the Andaman Islands, the Malay Peninsula, certain of the Philippine Islands, and the interior of New Guinea, the pure Negritos being certainly represented only by the Mincopies, Sakai, Aetas, and Tapiro. The Mincopies of the Andaman Islands average 4 feet, 11 inches in height, are brachycephalic, broad-faced, extremely frizzly-haired, and have a skin of a dull leaden hue. The Semangs and Mantras, in the peninsula of Malacca, may be regarded as Negritos, while the Mintra and the Jakuns of Johore are Sakai-Malay half-breeds, with lighter skin and taller stature. Some authorities, however, regard them as Negritos. The Semangs (whose own name is Mendi or Menik) of northern Perak, Kedah, Rahman, Ranga, and Kelantan are described by Martin, who visited the Malay Peninsula in 1897, as representing a dark-brown ulotrichous variety of man, while the Sakai (whose own name is Senoi) of southeastern Perak and northwestern Pahang are a brown cymotrichous variety. Both are distinct alike from the Malayan and the Mongoloid peoples. The Blandas, Ma-meri (or Besesi) of southern Selangor, the Mantra of the territory of Malacca and Rembau, and the Jakuns of Johore he styles mixed peoples. As to head form, the Semangs are mesocephalic (tending to dolichocephalic with an index of 78 to 79), the purest Sakai are dolichocephalic, and the Besesi brachycephalic. The hair of the Semangs is frizzy or thick woolly, while that of the Sakai and of the mixed tribes is for the most part wavy. The Semangs average 5 feet in height and have remarkably convex lips, a typical Pygmy trait. The Sakai are now classed

with the Vedda and some jungle tribes of the Deccan as remnants of a pre-Dravidian race, which is believed to have had a wide distribution. They are thus not Negritos, but belong to the other main stock of Asiatic Pygmies. The Aetas of the Philippines, who number altogether some 10,000, are found in certain parts of the interior of Luzon, Mindoro, Panay, and Negros, and northeastern Mindanao. Their skin is of a dark-chocolate brown, their mean height is 4 feet, 9½ inches, and the cephalic index of 16 males averages 82.2. The culture status of the Negritos is very primitive, though the arts and industries of the Andaman Islanders, the best-studied members of the stock, give more evidence of talent and ingenious adaptation to environment than is commonly attributed to them. The bow and arrow (often poisoned) is a characteristic Negrito weapon.

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NE'GRO (Sp., Portug., It. *negro*, black, from Lat. *niger*, black). The name properly applied to a subspecies of mankind of whom the chief characteristics are a dark skin, woolly or frizzly hair, and a dolichocephalic skull. The negroid type presents many modifications and has obtained a fairly wide dispersion, but is found in its purest state and in greatest numbers in Africa, and that continent must be considered its centre of distribution.

It is commonly held that the type is best represented by the Sudanese tribes of Africa, who are regarded as true negroes. They are distinguished by a very dark-brown or chocolate-colored skin, black crisp hair which is flat on section, a relatively long head, with flat, broad nose and projecting jaws with thick, everted lips. In stature they are tall, with long arms and slender legs.

The most important modification of this type is found in the Bantu group of tribes, which stretches southward in Africa from the Sudan to the Cape of Good Hope. This division is one based largely on linguistic grounds, and, presenting as it does many variations of slight extent, it is impossible to name any single physical character which distinguishes the Bantu negro from the Sudanese. In general, however, the Bantu face is less coarse than the Sudanese, the jaws less projecting, and the lips not so thick. In color of skin the Bantu shows all shades of dark brown, and in stature corresponds to the Sudanese.

A marked variation, and one difficult to account for, is seen in the dwarf races which are found in scattered groups across Central Africa surrounded by Bantu neighbors and extending far to the south, where they are represented by the well-known tribe of Bushmen. The Bushmen have usually been regarded as forming an independent stock not to be classed with the Pygmies of the equatorial region, but recently Kuhn and Von Luschan have argued vigorously for the essential unity of these tribes. On the other hand the Hottentots are surely distinct from both and have even been regarded as of Hamitic stock, though hardly on convincing evidence. See Colored Plate in article AFRICA.

The dwarfs offer striking physical traits which differentiate them from the other negroid peoples of Africa. In stature some of the northern Pygmies do not average much over 4 feet, the Bushmen seldom range over 5 feet, while the Hottentots are distinctly taller. In color the skin is a light yellowish brown and, in the true dwarf groups, said to be covered with a sort of down. The hair is crisp and, in the central dwarfs, of a rusty-brown color, while in the Bushmen group it is black and tufted.

Of the true negroes of the Sudan the most important tribes are, in the west, the Wolof, Mandingan, Felup, Timni, Kru, Sierra Leonese, Liberian, Tshi, Ewe, Yoruba, Ibo, Efik, Borgu, and Mossi; in the central Sudan the Sonrhay, Hausa, Mosgu, Kanembu, Kanuri, Baghirmi, and Yedina; and in the east the Maba, Fur, Nuba, Shilluk, Dinka, Bari, Abaka, Bongo, Mangbattu, Zândeh (Niam Niam), Monfu, and Bari.

Of the Bantu tribes traced southward along the east coast and northward along the west, following their probable course of migration, some of the most important divisions are the Bonjo, Baya, Waganda, Wanyoro, Wapokomo, Wagiryama, Waswhahili, Zulu, Mashona, Bechuana, Ova-Herero, Eshi-Kongo, Bashilange, Balolo, Manyema, Bakalai, Fan, Mpongwe, Dwala, and Batanga.

These peoples include the bulk of the African negroids. The dark-skinned natives of the north, viz., in Abyssinia and in neighboring regions and along the Mediterranean, exhibit such differences and are so allied in other respects with Semitic and Hamitic peoples that they are usually classed with them.

The extra-African distribution of negroid stocks immediately presents difficulties. We can disregard the negroes of the two Americas, who are almost invariably of West African descent and differ from their parent stocks only in the modifications due to mixture with Europeans and Indians.

The Australians must be considered an independent race presenting physical characteristics which differentiate them from the true negro, notwithstanding their dark skins.

There are, however, in the East Indian Archipelago, in New Guinea and Melanesia, and in Madagascar negroid tribes whose classification and relationships present difficulties at present insurmountable. Of these stocks the Papuans of New Guinea and the Melanesians are the most numerous and important. They are a dark-skinned, dolichocephalic race and differ physically from the African negro chiefly in the hair, which is longer and moplike, and in facial features, which latter, however, are variable. There are no safe grounds for considering them as a branch of the true negro stock other than the striking resemblance in skin color.

At different points in the northern portion of this region are found scattered groups of an undersized negroid stock commonly called Negritos (q.v.). They are usually compared with the dwarf races of Africa and undoubtedly do offer striking similarities in physical charac-

ters, but in other respects seem to correspond rather to the Australian and Papuan.

The parentage of the negroids of Madagascar is also in dispute. The proximity of Africa would indicate an origin from that continent, and there are both physical and cultural facts to support the view, but there are also unmistakable signs of Melanesian traits which suggest immigration from both regions.

Much has been written as to the mental capacity of the negro, but trustworthy information is scanty. Such few careful observations as have been made upon negro brains indicate a slightly lower type than that of Europeans, but the variability is so high as to forbid drawing any conclusions regarding the accompanying intellectual powers—a statement which holds true of the natives of Melanesia as well as of Africa.

In culture the negro presents almost as many degrees and varieties as there are stocks. A relatively low grade represented by certain of the Sudanese, Bantu, and dwarf tribes is found side by side with a relatively high civilization, as, e.g., that of the Hausa; but it must be admitted that the sporadic examples of marked cultural progress in Africa can almost invariably be traced to Arabic or other foreign influence. Environment has, of course, produced specific types of culture in different parts of the continent, such as the cattle-breeding, pastoral life of the south and west and the strictly hunting life of the dwarfs of the equatorial forests, and this diversity makes general statements dangerous or impossible.

With regard to religion we find an extensive animism which has developed remarkably at different points. For example, the ancestor worship of the Zulus has been carried to a logical extreme, which is unique among savages, and the complex fetishism of west Africa is everywhere regarded as the type of that phase of belief.

Political organization is equally diverse, ranging from hereditary kingship to such loose tribal systems that no chieftainship is ascertainable.

In comparison with other great groups of mankind the negro seems to possess certain temperamental qualities which are more or less characteristic, being lively, excitable, and fond of social life and discussion, and this trait has undoubtedly played an important rôle in the development of certain phases of African culture. Our knowledge of the majority of the negro tribes of Africa is still lamentably slight, but, with the extension of European interests in that continent, much valuable information is coming to light.

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NEGRO, nā'grō, Río. 1. A tributary of the Amazon. 2. A river of Argentina. 3. A territory of Argentina. See RÍO NEGRO.

NEGRO BUG. A plant bug of the family Corimelænidæ. These bugs are usually of very small size and are intensely black in color, sometimes having a bluish or greenish tinge. They are convex in form, the scutellum covering nearly the whole upper side of the body, and are often mistaken for small beetles. They are fond of laying their eggs on small fruits, like blackberry and raspberry, giving them a very disagreeable taste. A common species in the United States, the flealike negro bug (*Corimelæna puticaria*), is frequently mistaken for the chinch bug.

NEGRO EDUCATION. Much of the negro advancement in the United States since the Civil War is to be credited to the regular habits of industry and to the knowledge of the white man's religion, language, and ways of life gained in slavery days. To one connected with negro schools nothing is clearer than the value of the influence of good Southern white families upon their slaves. Some of the plantations were really large trade schools where habits of industry were formed. Carpenters, coopers, sawyers, blacksmiths, tanners, curriers, shoemakers, spinners, weavers, knitters, and distillers were all to be found among plantation slaves, and the negro mechanic was an important man in the community. Thus the race was being gradually trained in the ways of civilization, was contracting the habit of labor, acquiring a superior language and religion, and developing a character capable of further advancement.

Credit should also be given to the training which the colored man received during the Civil War. In the Northern armies there were thousands of colored troops who received discipline of the most valuable sort. In the South the homes and farms of the white Confederate soldiers were largely in the hands of negro men and women. Most valuable to the slaves was the gain in power and executive ability that came out of that experience. While their masters were fighting to keep them in slavery, they were receiving in the absence of those masters the education which was to fit them to be freemen.

Upon the heels of the Northern armies came an army of devoted women, eager to teach the freedmen. In September, 1861, the American Missionary Association opened its first school for contrabands at Hampton, Va., the outcome

of which is the Hampton Normal and Agricultural Institute (q.v.). In the following January schools were started at Hilton Head and Beaufort, S. C., and in 1862 and 1863 teachers were sent to Tennessee. The Rev. John Eaton, an army chaplain from Ohio, afterward United States Commissioner of Education, was placed by General Grant in charge of the instruction of the colored people, of whom it is estimated that more than 1,000,000 learned to read and write; of the 80,000 colored troops in the Northern army, 20,000 learned to read and write. The churches of the North vied with one another in their endeavors to bring education to the black man. In 1865 the Freedmen's Bureau (q.v.) was established, and, in addition to other work, it superintended the education given to the freedmen by the government and the churches of the North. Between 1865 and 1870 more than $5,000,000 were expended by this organization for educational purposes. In some cases government buildings and land were granted.

The proved capacity of the negroes for education suggested the wisdom and economy of providing their schools with teachers of their own race, and during the years from 1868 to 1878 there were founded 25 normal and collegiate institutions under the control of different religious denominations, the Congregationalists and Baptists leading in the number and size of their schools. They extended from Hampton in Virginia to Tillotson in Texas. At Atlanta, Nashville, Chattanooga, and other centres institutions were built costing from $200,000 to $500,000 and having a yearly attendance of from 300 to 500 students. They have trained many of the teachers of the negro race.

The work of these schools has often been criticized and sometimes, perhaps, justly; but it is nevertheless true that they have had much to do with the uplifting of the negro race. From them have gone forth many of the best teachers of the negro public schools. Most of these institutions had as their model the New England high school or college. Latin and Greek had often a prominent place. The practical side of education, which was largely provided for in the New England home, was not supplied in the one-room cabin of the South. Too great emphasis was sometimes placed upon the literary and academic side of education and too little upon the gaining of a knowledge of the common things of life and of the forming of habits of intelligent industry. It was natural that the colored man, after years of forced labor, should revolt against any education that gave prominence to the work of the hand. It was natural that his teacher, who heard it continually said that negroes were fit only to be hewers of wood and drawers of water, should wish to prove that they could become successful lawyers, physicians, and clergymen. The wisdom of raising up leaders of a people is unquestioned, but where 80 per cent of a race live on the land, as is the case with the blacks of the South, and where a large majority live, as the masses of the negro race still do, in one-room cabins under the lien system of crops, it has been recognized that there must be a close relation between education and vocation, and that their teachers and clergymen should be taught how to build their own houses and how to cultivate their land properly.

What is called race prejudice has resulted in a system of public schools taught by colored teachers which, while it has its disadvantages, has resulted in good to the race.

Before the year 1870 there were practically no negro public schools, with the exception of those in Memphis, New Orleans, and Nashville. There were, however, in the District of Columbia 10,494 colored children in public and private schools. In 1870, while for the most part there was opposition, certain farseeing Southerners declared in favor of the education of the blacks. In 1871 a little improvement was made. In 1872 Delaware and Kentucky were the only States that had not made provision for negro education. In 1873 and 1874 State normal schools began to be established for the training of negro teachers. In 1877 the total number of negro children reported of school age was 1,513,065 and the number enrolled in the schools 571,506. There were 27 normal schools with 3785 pupils and 23 institutions for secondary instruction with 2087 pupils. In 1882–83 the colored school population in the District of Columbia and the former slave States was 1,944,572 and the enrollment 802,982. Thus, less than 20 years after the war there was built up in the South a public-school system for both whites and blacks, with normal schools for the training of teachers, which, considering the poverty of the States, was admirable. In 1897–98 there was an enrollment in the schools of 1,506,742 colored children, or 52.97 per cent of the colored school population, while in 1900–01 there was an enrollment of 51.46 per cent of the negro children. The enrollment for 1903–04 was 1,577,385 and the percentage 55.14. The average daily attendance in the colored schools is 64.38 per cent of their enrollment. In 1912–13 there was an enrollment of 1,769,859 colored children, or 56.05 per cent of the colored school population, and an average daily attendance of 1,089,354, or 61.55 per cent of their enrollment. In the same year there was a total of 156 public high schools and 270 private schools for colored pupils, giving secondary, normal, collegiate, and industrial courses. The number taking secondary courses was 25,559. In addition 29,481 students were taking collegiate and professional courses.

No account of negro education in America would be complete which did not include an account of the work of Gen. S. C. Armstrong at Hampton Institute. Believing in the moral value of self-help, General Armstrong built up a school in which greater prominence was given to doing than to mere learning, where there was not only the schoolroom, but also the workshop; not only the church, but also the farm; not only the training of the mind, but also that of the heart and hand. An effort was made in this school to fit men and women for definite conditions, to develop a love for intelligent work, and to inspire in its pupils a strong desire to go out and help to uplift their people. The school at Tuskegee, founded by Booker T. Washington, Hampton's most distinguished graduate, was established with similar views. While receiving help from the North, both of these schools have put themselves in the closest touch with the South and its public-school system. Their influence on this system has been marked. As a result of the kind of training given at Hampton and Tuskegee, hundreds of young people have been sent out who, by the establishment of homes, the cultivation of land, and the carrying on of business enterprises,

have reconstructed whole communities. There is reason to believe that this type of school is meeting the pressing need, on the part of the negro people, of knowledge of the common duties of life, while, at the same time, it is providing a kind of training which results in the stability of character so lacking in the masses of this people.

In the establishment and conduct of negro schools two wisely administered funds have had a large share. (See PEABODY EDUCATION FUND; SLATER FUND.) Mention should also be made of the Southern and General Education Boards, which are composed of prominent Northern and Southern men. Both these agencies represent a union of wealth, business sagacity, and educational statesmanship that augurs well for the cause of universal education. The Southern Education Board conducts a campaign of education for the purpose of stimulating public sentiment in favor of more liberal provision for the common schools for both races. Its work is supplemented by that of the General Education Board, which, in addition to collecting information in regard to existing educational conditions among both races, disburses certain funds where they are most needed for the strengthening of the agencies tending to promote the education of all the people. The board, e.g., coöperates with State departments of education by paying the salaries and expenses of State agents for negro rural schools in the South. The function of the agents is not only to educate the public, but to improve school curricula along industrial and domestic lines and encourage farm demonstration and clubs. The board also coöperates with and manages the Anna T. Jeanes Fund for supporting industrial supervisors and teachers. Through the State supervisors, again, the negro teachers are improved by the holding of institutes and summer schools. Finally, the board, through its support of negro colleges, encourages the training of leaders of the race.

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NEGRO EX'ODUS. The name applied to a movement of freedmen from the Southern to the Western and Northern States in 1879 and 1880. The movement began in the early spring of 1879, and before the close of 1880 fully 40,000 negroes had removed to Kansas alone, while a large number had settled in Missouri and Indiana also. Many arrived at their destination poorly clad, generally destitute, and without promise of employment, and for a time there was much want and suffering among them. Large sums of money, however, were contributed for their relief throughout the North, and especially in Kansas, where, soon after the arrival of the first band of immigrants, an efficient Freedmen's Relief Association was organized. The only Southern States from which the blacks emigrated in any considerable numbers seem to have been Mississippi, Louisiana, and Texas. The chief reasons given by the negroes for the abandonment of their homes were that they were forced to pay excessive rents, that the system of land tenure in the South was unjust, that exorbitant prices were charged by credit merchants, and that the freedmen were wholly denied political recognition and were kept down in every way by bulldozing methods. Opponents of the movement asserted that the negroes had been misled by the representations of land speculators, by misguided philanthropists, and by politicians who, in view of the approaching presidential election, wished to import numbers of Republican voters into various parts of the North, where the Republican majority was doubtful. The movement seems to have been considerably furthered by the Nashville Colored Convention, which met in Nashville, Tenn., May 7, 1879, adopted a report setting forth the grievances of the blacks and the many disadvantages, social, economic, and political, under which they labored in the South, and recommending that the negroes should emigrate to those States where their rights were not denied them. For an account of the causes of the movement, consult an article by Runnion, "The Negro Exodus," in the *Atlantic Monthly*, vol. xliv (Boston, 1879); and for arguments justifying and condemning the movement, consult articles by R. T. Greener and Frederick Douglass, respectively, in the *Journal of Social Science*, vol. xi (ib., 1888).

NEGRO IN AMERICA. The first appearance of the negro in the English colonies in America was in 1619, when a cargo of negro slaves was landed at Jamestown. The scarcity of labor, especially in the Southern colonies, created an increasing demand for negro slaves, and by 1714 the number had increased to 58,850 (estimated). The greater part of these were brought direct from Africa, although considerable importations from the West Indies took place, and natural increase contributed an appreciable number. Importation was carried on more extensively in the following half century, the aggregate of negroes in the colonies reaching about 300,000 in 1754. In 1790 the first census found 757,208 in the United States. In the next 100 years this number was multiplied tenfold. This extraordinary growth in numbers has been due chiefly to natural increase, although importations were considerable up to 1808, when they were prohibited by the Constitution. The smuggling in of Africans continued, however, up to the Civil War. Since that time there has been some immigration of negroes from the West Indies, not sufficient, however, to affect the truth of the proposition that recent growth in negro population practically represents a natural increase.

It is a matter of great importance whether or not the negro population is increasing more rapidly than the white. Table I shows the number of negroes in the United States for each decade from 1790 to 1910, together with the percentage of the total population which the negroes represent.

TABLE I

CENSUS	Negroes	Percentage of total population of United States
1790	757,208	19.3
1800	1,002,037	18.9
1810	1,377,808	19.0
1820	1,771,656	18.4
1830	2,328,642	18.1
1840	2,873,648	16.8
1850	3,638,808	15.7
1860	4,441,830	14.1
1870	4,880,009	12.7
1880	6,580,793	13.1
1890	7,488,788	11.9
1900	8,833,994	11.6
1910	9,827,763	10.7

It will be seen that the proportion of negroes to the general population has declined for every decade since 1810 except 1870–80; and it is now generally understood that the apparent increase for that decade was the result of faulty enumeration. It is true that much of the relative increase in white population is to be ascribed to immigration (q.v.). Nevertheless, it appears that the native white population is increasing faster than the negro population. Thus, for the decade 1900–10 the native whites of native parentage increased 20.9 per cent, while the negroes increased only 11.2 per cent.

Distribution of Negro Population. In the Colonial period negroes were found in every Colony, but were most numerous in the South, where their services were in greater demand. The abolition of slavery in the North led to greater concentration in the South; and by 1860, out of 4,441,830 in the United States, only 226,216 lived in the Northern States. Since the war a considerable diffusion has taken place. At times it has been feared that a large proportion of the negroes would flock to the North; but adverse climatic conditions and the difficulty of competing with white labor have forced most of the negroes to remain in the South. See Table II for the distribution of negroes.

Relatively to the general population the negroes increased in the last decade in the States of Vermont, New York, Illinois, Iowa, West Virginia, Arkansas, Wyoming, Utah, Nevada, and California.

Georgia had a negro population in 1910 of 1,176,987; Mississippi, 1,009,487; Alabama, 908,282; South Carolina, 835,843. Virginia, North Carolina, Louisiana, and Texas exceeded 600,000. In Alabama the negroes are 42.5 per cent of the total population; South Carolina, 55.2; Louisiana, 43.1; Georgia, 45.1; Florida, 41.0. A more detailed statistical study would show a tendency of the negroes to concentrate in limited areas in some of the Southern States. Thus, in the three counties, Issequena Co., Miss., Tensas Co., La., and Tunica Co., Miss., negroes represent 94.1, 91.5, and 90.6 per cent of the total population.

Economic Condition of the Negro. As a laborer the negro is capable of the hardest physical toil, and works without difficulty where the humidity and heat render labor intolerable for the white. He is lacking in stability, and is inclined to roam from one district to another without any satisfactory reason; he is wasteful and careless, requiring constant supervision. These characteristics have largely determined his economic position. As an agricultural laborer the negro is indispensable in the South, more especially in the low, swampy districts, where the white laborer readily succumbs to disease. As a domestic servant the negro has proved his usefulness. In manufactures, on the other hand, negro labor is unsatisfactory, since the negro will not remain in a position long enough to develop a high degree of skill. The same deficiency is driving him out of the handicrafts. Under slavery a large number of negroes were trained in handicrafts, and proved to be valuable workmen after emancipation; but the generation which has risen since slavery has manifested an unwillingness to enter upon the long period of training necessary for the exercise of the trades. The tendency towards agricultural labor and personal service is illustrated by the statistics of occupations of the thirteenth census. Out of 5,192,535 engaged in gainful pursuits, 886,736 were engaged in domestic service and 2,857,732 in agriculture. The economic progress of the negro, except as an owner of land, is not susceptible of statistical determination. The amount of property of all kinds held by negroes is conservatively estimated at over half a billion dollars. The annual meetings of the National Negro Business League, organized in 1900, attest a decided advance in the number and magnitude of enterprises conducted by negroes.

The wages of the negro agricultural laborer in the South usually range from $6 to $10 a month, with substantial additions in the shape of food, house room, etc. In the busy season of the year the day laborer usually receives a far higher wage. A good cotton picker in the Yazoo-Mississippi delta often earns $1.50 a day. Whether wages are high or low, the negro laborer is likely at any time to leave his employment, with resulting embarrassment to the employer. Hence it is a common practice to let small holdings to negroes, in order that interest in the crop may diminish their migratory tendencies. According to the census of 1910, 890,141 farms were occupied by negroes, of which 175,290 were owned by their occupants; 43,177

TABLE II

DISTRIBUTION OF NEGROES

DIVISIONS	1880	1890	1900	1910
North Atlantic division	229,417	269,906	385,020	484,176
South Atlantic division	2,941,202	3,262,690	3,729,017	4,112,488
North Central division	385,621	431,112	495,751	543,498
South Central division	3,012,701	3,497,887	4,193,952	4,636,939
Western division	11,852	27,081	30,254	50,652

farms in addition were part owned. The tenant farmers sometimes pay a cash rental, but more frequently farm on shares. The landowner furnishes machinery and draft animals, receiving one-half the crop. Frequently he advances food and other supplies to the tenant, recouping himself out of the tenant's share in the crop. Share tenants represented 43.1 per cent of all negro farmers in 1910.

While the negro farmer still remains handicapped by lack of education, forethought, and technical skill, he is making notable progress in the direction of economic independence. Farms owned by negroes in the South increased in value from $123,754,396 in 1900 to $275,323,227 in 1910, or 122.5 per cent. The corresponding percentage increase for white owners was 99.6. In the North the negro manifests a tendency to concentrate in the cities, where his economic activities are chiefly confined to personal service and unskilled labor.

Social and Moral Conditions. When account is taken of the fact that the ancestors of the American negro were taken from a state of barbarism and were subjected only to comparatively weak moral restraint under slavery, it does not appear surprising that the social and moral condition of the negro is unsatisfactory. The great mass of the negro children receive an inadequate home training, and are therefore left to pursue their own inclinations, with the result that they readily lapse into their ancestral vices. The rules of monogamic marriage are but loosely obeyed—the exchanging of wives, e.g., being not uncommon on Southern plantations. Illegitimacy is common. In the cities adverse social conditions for which the negro is only in a small measure responsible increase the tendency to moral disorder. The negro quarter is usually in close proximity to the quarters given over to professional vice, and often the two are interpenetrating. Whether conditions are improving or deteriorating in this respect it is impossible to prove. It is, however, the testimony of a large number of observers that wherever the negro withdraws from the presence of the white population, moral conditions deteriorate; hence the tendency towards segregation noted above is generally viewed with anxiety by those who are most deeply interested in the improvement of the negro race. Wherever the economic conditions of the negro are improving, on the other hand, family life and morals also show a tendency towards improvement. The poverty of the masses of the negroes at present results in the overcrowding of cabins and tenements, which is destructive of family life and morality. For this reason students of the race problem look to the technical education of the negro as the best method of elevating him morally.

Statistics of crime present another serious problem connected with the presence of the negro in the United States. In 1890 there were in the Southern States 6 white prisoners to every 10,000 whites, and 29 negro prisoners to every 10,000 negroes. In the Northern States there were 12 white prisoners to every 10,000 whites, 69 negro prisoners to every 10,000 negroes. In the South negro prisoners increased 29 per cent per 10,000 between 1880 and 1890, while white prisoners increased 8 per cent per 10,000. In 1910 the enumeration of prisoners and juvenile delinquents for the United States as a whole gives the number of whites as 93,841 and the number of negroes as 42,631, or 45 negro prisoners to every 100 whites, as compared with 10.7 negroes to 100 whites in the general population. While it is no doubt true that a larger percentage of crimes against property committed by negroes is detected and punished, and hence the relative amount of negro criminality may be exaggerated, it is also true that a large number of negro crimes committed against members of their own race are not punished at all, and so do not appear in the statistics of criminality. Crimes of violence appear to be increasingly frequent where the negroes are least in contact with the whites.

The greatest improvement in the position of the negro appears in the statistics of education. At the close of the Civil War it is doubtful whether more than 5 per cent could read and write. In 1900 the percentage of illiteracy had been reduced to 44.5 per cent. A further decrease to 30.4 per cent had taken place by 1910.

Political Condition. After the close of the Civil War, the negroes, under the leadership of a certain class of whites, practically controlled the government of many of the Southern States. (See RECONSTRUCTION.) Their ignorance and lack of political training rendered them incapable of exercising political power wisely, and they were gradually excluded from power by the whites, at first by wholly illegal means, later by State laws and constitutional amendments. In 1890 the constitution of Mississippi was amended so as to exclude from the suffrage any person unable to read any section of the constitution or to understand it when read to him and give a reasonable interpretation of it. Payment of a poll tax was also required. The effect of this amendment was the exclusion of the greater part of the negro vote. In 1895 South Carolina amended its constitution so as to exclude the vote of any one unable to read or write any section of the constitution, or to show that he owned and paid taxes on property assessed at $300 or more. In 1898 Louisiana passed a similar amendment, with the addition of the so-called grandfather clause excusing from the limitations of the amendment all descendants of men who voted previous to the war, thus admitting to the suffrage illiterate, propertyless whites. North Carolina took similar action in 1900, though no property qualification was required. In 1901 a constitutional amendment was adopted in Alabama practically disfranchising the negro. Georgia took similar action in 1908 and Oklahoma in 1910. In 1915 the grandfather clause of the Oklahoma law was held unconstitutional by the United States Supreme Court.

For the solution of the various negro problems, social, economic, and political, several plans have been brought to public attention. Repatriation of the negro in Africa was widely advocated, especially in the first two decades after the Civil War; but the plan has been generally abandoned as impracticable, since the negro manifests no desire to return to Africa, and could not be forced to emigrate against his will. From a moral point of view, the plan has been condemned on the ground that it would mean a reversion to barbarism of the greater part of the race. Economically its effects would be grave, since the Southern States must for a long time rely upon the negro for unskilled labor.

The plan which finds greatest favor at present is the industrial education of the negro, the encouragement of landownership by those who are now tenants, and the general extension of

education. (See NEGRO EDUCATION.) The plan has already produced valuable results. Graduates of institutions like Tuskegee (q.v.) and Hampton Institute have proved that under the leadership of members of their own race negro communities are capable of rapid improvement, economically and morally. See NEGRO; NEGRO EDUCATION; SLAVERY.

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NEGRO LETH'ARGY. See SLEEPING SICKNESS.

NEGRO MELODIES. The music of the American negroes is essentially vocal. Their few musical instruments are of importance only for furnishing accompaniments to songs or for accenting the rhythm of the dance. Negro music has been steadily losing its distinctive features, owing to the tendency among the younger generation to discard everything which harks back to the days of slavery. The old plaintive melodies have been replaced largely by more modern comic and erotic songs which are cast in a nondescript Afric-European mode.

Negro songs may be divided into two general groups—those which show evidences of foreign origin, but which have been added to and changed until they are undeniably negro in character; and those which are the spontaneous expression of the negro's own feelings. The first group may be subdivided into (*a*) those derived from European songs and dances and (*b*) those adapted from Baptist and Methodist hymns. The original negro songs, whose most typical element is a weird recitative, have undoubtedly an affinity with the musical forms used in Africa, but they have been greatly expanded both rhythmically and melodically. Though it is possible to make some such analysis of negro melodies, the most important feature, their interpretation, cannot be adequately described. Impromptu chords, notes, and accents are introduced, the whole blending into unusual forms with strikingly original melodies and motives. Strange to say, the time structure is excellent, and the tempo is universally exact. The tunes have as a rule a range of few notes, and, as in Africa, the major key predominates. In some songs both the major and minor keys are used. The weird effect produced by many of their cadences is not as a rule due to the use of the minor key so much as to the employment of the pentatonic scale and the major scale with the flat seventh. A distinctive character of negro melodies is the rhythmical snap, which became such an overworked feature in "ragtime." See FOLK MUSIC; RAGTIME. Consult: F. L. Ritter, *Music in America* (new ed., New York, 1900); C. L. Edwards, *Bahama Songs and Stories* (ib., 1895); J. B. T. Marsh, *The Story of the Jubilee Singers and their Songs* (Boston, 1880); H. E. Krehbiel, *Afro-American Folk-Songs* (New York, 1913).

NEGRO MONKEY. 1. A sooty black langur (*Semnopithecus maurus*, or *Pygathrix aurata*), about 24 inches long, plus a still longer tail. The animal is well known in Java. Its young are reddish in color and grow black with advancing age. 2. A marmoset (*Midas*, or *Cercopithecus, ursulus*) of Brazil, also called negro tamarin, and often tamed. It is black, with a reddish dorsal stripe. See LANGUR.

NEGROS, nā'grōs. One of the Philippine Islands, belonging to the Visayas group. It lies between the islands of Panay and Cebú. It is separated from Panay and the small island of Guimarās on the northwest by the Strait of Guimarās, 8 miles wide at the narrowest, and from Cebú on the east by the Strait of Tañón, from 6 to 22 miles wide (Map: Philippine Islands, D 6). On the north the island borders on the Visayan Sea, and on the southwest and south it is washed by the Sulu Sea, which to the southeast separates Negros by a distance of 30 miles from Mindanao. The island is roughly rectangular, but very elongated in shape. Its length is 134 miles, and its average breadth 26 miles, increased near the southern end to 34 miles by a broad, rounded peninsula extending from the western coast. Its area is given as 4881 square miles. Including a number of small dependent islets, the area is 4994 square miles. It ranks fourth in size among the Philippine Islands.

The coasts are clear and steep, but very little indented, and afford no harbors except a few anchorages sheltered by the small adjacent islands. The whole interior consists of a mountainous plateau with a central ridge containing peaks above 4000 feet, running the entire length of the island and dividing it into two distinct halves, forming its two political divisions. The active volcano of Canlaón, or Malaspina, situated in the north-central part of the island, is 8192 feet high, but the island suffers less from volcanoes than others of the archipelago. The range terminates at the north in the remarkable isolated peak Solitario. The two slopes are eroded into numerous lateral valleys watered by short and generally simple streams, the largest being on the western slope. In the southern part are two remarkable mountain lakes, the larger 6 miles long. The mountains of the interior are covered with vast forests of valuable timber, among which the teak is prominent. The soil is everywhere fertile, and agriculture is the principal occupation. The chief products are sugar, manila hemp, copra, tobacco, rice, cacao, and corn. Negros Occidental is one of the most important sugar-growing regions of the islands. The fisheries are next in importance to agriculture, and cattle raising also receives considerable attention, large numbers of horses, carabaos, and hogs being raised.

There are no manufactured products of importance, the few that there are being outgrowths of the agricultural activities of the inhabitants. The interior, once an impenetrable wilderness, is fast being opened. The population of the island in 1903 was 460,776, of whom 21,217 were wild. The prevailing race is the Visayan, and the Visayan is the language most spoken. The forests of the interior are inhabited by roaming savages. Politically the island is divided into the two provinces of Negros Occidental and Negros Oriental, whose areas, respectively, are 3130 and 1864 square miles, and whose populations are 308,272 and 201,494. The island of Sequijor, which is part of Negros Oriental, has an area of 106 square miles, and in 1903 had a population of 46,023. The capital of the former is Bacólod, and of the latter Dumaguete. The two old provinces were continued under civil government by the Philippine Commission Act of Feb. 6, 1901. Some resistance was offered to the authority of the United States by bands of natives, who kept American troops actively engaged on the island during the campaigns of 1899 and 1900. Consult *Apuntes de la Isla de Negros* (Manila, 1894).

NEGRUZZI, nā-grōōt'sē, KONSTANTIN (1808–68). A Rumanian poet, born at Jassy, the disciple and translator of the poet Pushkin. He also translated some of Hugo's works, and wrote an epic poem, *Aprodul Purice*, and a volume of verse and prose, *The Sins of Youth. Alexandru Lăpusneanu*, a historical short story, is one of the masterpieces of Rumanian literature. His *Complete Works* were published in 1873. His son, JACOB (1843–), was born at Jassy and became professor of commercial law at the university there, and afterward at Bucharest (1885). In 1867 he founded the literary journal, *Convorbiri Literare*, of which he was for 28 years the editor. His writings include: *Poesii* (1872); *Miron si Florica*, an idyl; *Mihaiu Vereanu*, a novel; the short stories in *Copii după natură;* and a number of plays. His *Collected Works* were published at Bucharest (6 vols., 1894–96).

NEGUN'DO (Neo-Lat., from the North American Indian name). A group of trees sometimes separated from *Acer* as a genus of the family Aceraceæ (see MAPLE), differing from the maples chiefly in the apetalous diœcious flowers and in the pinnated ashlike leaves. The common species, *N. aceroides*, known as ash-leaved maple, or box elder (q.v.), is a native of North America, often planted for ornament and extensively cultivated in the western United States. It is now generally referred to as *Acer negundo*. See Plate of BIGNONIA.

NEHAN'TIC. See NIANTIC.

NE'HEMI'AH (Heb. *Nĕhemyah*, Yahwe is consolation). A Hebrew leader of the fifth century B.C., whose memoirs are embodied in the Book of Nehemiah of the Old Testament. It is there stated that he was a son of Hachaliah, and cupbearer to Artaxerxes (i.e., Artaxerxes I, Longimanus, 465–425 B.C.), in the palace of Shushan. Having learned the sad condition of the returned colonists in Jerusalem, he prevailed upon the King to send him to his brethren there with full powers "to seek their welfare." He received an appointment as governor, and worked for the safety of the city and its inhabitants. He rebuilt the city walls, notwithstanding many hindrances and dangers; he induced people from the country—priests and laymen—to take up their abode in the city, thus promoting its prosperity; above all he rekindled the flame of ancient piety and enthusiasm for the observance of the law in the hearts of the rough immigrants. He then returned to Persia, trusting to the new vitality which his reforms had, as he thought, infused into the Jewish commonwealth. But not long afterward he had again to obtain leave from the King to return for the purpose of abolishing many abuses that had crept in during his brief absence. He enforced the rigorous observance of feast and Sabbath, and rearranged the temple service, procuring at the same time the means for its proper support by inducing the people to offer the tithes as of old.

Owing to the changes in the memoirs of Nehemiah which have been made in the course of the different editings to which they have been subjected (see NEHEMIAH, BOOK OF), it is difficult to separate the actual course of events from the traditional view concerning Nehemiah's activity. This much, however, seems certain: that Nehemiah paid two visits to Jerusalem, the one in 445 B.C., the other probably in 433. He came the first time on a special mission to protect Jerusalem from attack by rebuilding the walls, and for this work he was intrusted with full powers by the Persian King. He completed the restoration of the walls in the short space of 52 days, and provided for the proper guarding of the gates; afterward he returned to the Persians. In this visit he appears as the governor. In the second, however, he holds no such office; his purpose is to insure the enforcement of the rules against marriages between Jews and non-Jews. See EZRA.

NEHEMIAH, BOOK OF. One of the historical books of the Old Testament. In some Greek and Latin versions it is called the Second Book of Ezra, and in the Jewish canon the books of Ezra and Nehemiah originally constituted one book. It is the opinion of modern scholars that both books were put into their present form by one and the same editor. (See EZRA, BOOK OF.) The period covered by the Book of Nehemiah is the years 445–432 B.C. It is based upon the genuine memoirs of Nehemiah, but also, according to the critical view, contains much extraneous material, the memoirs having been freely used by compilers whose aim it was to prove that the work of restoration of the temple, the cult, and the general reorganization was performed by Babylonian Jews who returned from the exile; whereas, as a matter of fact, much of the work was due to the section of the Jewish community of Jerusalem which had remained in the country. The contents of the book may be summarized as follows: Nehemiah's sorrow over the desolation of Jerusalem is depicted, and he prays to God for opportunity to rebuild the city (chap. i). Permission is granted him by the King to undertake the work; he arrives at Jerusalem, surveys the ruins, and begins to rebuild the walls (chaps. ii–iii). The opposition of enemies is related and the plans by which their schemes were defeated (chap. iv). The people complain against the oppression of the nobles, and the evil is redressed (chap. v). Enemies form a plot to interrupt the work, which is frustrated by Nehemiah's boldness (chap. vi). A record of the families that returned first from Babylon is given, followed by an account of the offerings made by rich and poor for the work (chap. vii). The law is read by Ezra the Scribe, accompanied with a joyful celebration of the

Feast of Tabernacles (chap. viii). The people mourn, fast, and repent, a full confession of sin is made and a solemn covenant sealed by princes, priests, and Levites, and confirmed with an oath by the whole multitude to observe the law, sanctify the Sabbath, sustain the services of the temple, and bring in all the tithes (chaps. ix–x). A tenth of the people are selected by lot to dwell in Jerusalem, and the rest are distributed through the other cities of the land (chap. xi). A list of priests and Levites is given, and the joyous dedication of the wall, accompanied with sacrifices, is described (chap. xii). During Nehemiah's absence in Persia heathen strangers were admitted into the temple; they are expelled after his return, and the broken covenant to pay the tithes, to sanctify the Sabbath, and to refrain from mixed marriages is enforced (chap. xiii).

The chronological questions involved in the Book of Nehemiah will be found discussed in the articles Ezra, Book of; Nehemiah. As to how much of the book represents Nehemiah's memoirs, scholars are not agreed. The genuine historical basis of the work is probably the account of Nehemiah's first visit, his activity in the rebuilding of the walls, his return to Persia, and his subsequent second visit to Jerusalem. For literature, consult the works mentioned under Ezra, Book of.

NEHLIG, nā'lēg', Victor (1830–?1910). An historical painter, who was born in Paris and lived there most of his life. He was a pupil of Cogniet and Abel de Pujol, and came to the United States in 1850. He opened a studio in New York, and in 1870 was made a member of the National Academy of Design. In 1872 he returned to Paris. Nehlig painted chiefly historical scenes, among the best of which are: the "Bravo" (1870); "Armorer of the Olden Time," "Gertrude of Wyoming," the "Artist's Dream," the "Cavalry Charge of Lieutenant Hidden," New York Historical Society; "Battle at Antietam," in possession of William Astor, New York; the "Captive Huguenot," "Pocahontas," "Hiawatha," the "Serenade," and "Waiting for my Enemy."

NEHRING, nā'rĭng, Wladislaw (1830–1909). A German Polish scholar, born at Kletzko, near Gnesen. He was educated at the University of Breslau, where he was appointed professor of Slavic languages and literature in 1868. Among his publications are: *Kurs literatury polskiéj* (1866); *Studya literackie*, a collection of monographs on the literature of Poland (1884); "Ueber den Einfluss der altčechischen Literatur auf die altpolnische," in *Archiv für slavische Philologie* (1876 et seq.); *Iter Florianense* (1871); a Latin (1856) and a Polish (1860–62) work on the Polish historians of the sixteenth century; *Altpolnische Sprachdenkmäler* (1887); and a revision of Poplinski's *Grammatik der polnischen Sprache* (1901). Consult the obituary notice by Jagić in *Archiv für slavische Philologie* (Berlin, 1909).

NEIDHART VON REUENTHAL, nīt'härt fŏn roi'ĕn-tâl (c.1180–c.1250). A German poet, born in Bavaria. He participated in the crusade against Damietta, Egypt (1218–19), and later resided at the court of Frederick the Quarrelsome in Vienna. From Frederick he received a fief near Melk and other valuable gifts. He was the originator of a new form of the mediæval lyric—the peasant lyric written under the influence of the court. In this he satirizes the wealthy but vulgar peasantry of Bavaria and Austria, with its display of finery, its brawls, and its insolence to betters. For this ridicule he was bitterly disliked by the rustic versifiers and, by the name Neidhart Fuchs, was known as the enemy of the peasants as late as the sixteenth century. Neidhart's work was an important one in the development of the Volkslied, upon which it continued for two centuries to leave a distinct impression. Neidhart is co-hero with the Pfaff Amis of Anastasius Grün's (Count Auersperg's) *Pfaff vom Kahlenberg* (Leipzig, 1850; 3d ed., 1877). A manuscript collection of his poems, dating from the thirteenth century, was edited by Benecke, in volume ii of the *Beiträge zur Kenntnis der altdeutschen Sprache* (Göttingen, 1832). The critical edition by Haupt (Leipzig, 1858; Keinz, 1889) is excellent. Consult: Von Liliencron, "Ueber Neidharts höfische Dorfpoesie," in *Zeitschrift für deutsches Altertum*, vol. vi (Leipzig, 1848); also Wilmanns, in the same journal as above, vol. xxix; Bielschowsky, *Leben und Dichten Neidharts von Reuenthal* (Berlin, 1891); Pfeiffer, *Die dichterische Persönlichkeit Neidharts* (Paderborn, 1903).

NEILE, nēl, Richard (1562–1640). An English ecclesiastic, born at Westminster and educated at St. John's College, Cambridge. In 1605–08 he was dean of Westminster, and he held the bishoprics of Rochester (1608–10), Lichfield (1610–14), Lincoln (1614–17), Durham (1617–28), and Winchester (1628–31). In 1631 he was appointed Archbishop of York. In 1608 he made William Laud his chaplain and subsequently promoted Laud's advancement. Very active politically, he was made Privy Councilor in 1627 and participated regularly in the Star Chamber and High Commission sessions. His correspondence with Laud and others is considered a valuable historical source.

NEILGHERRY (nēl'gē-rĭ) **HILLS.** Mountains in India. See Nilgiri Hills.

NEILGHERRY (or **NILGIRI**) **NETTLE** (*Girardinia palmata*). A plant of the family Urticaceæ, nearly allied to the true nettles and possessing the stinging power common in them. It is frequent on all the higher ranges of the Nilgiri Hills. The natives obtain the fibre by first boiling the plant, to destroy its stinging properties, and then peeling the stalks. There are said to be two or three distinct forms or varieties of Neilgherry nettle fibre, and different specific names have been given the plants producing them. Its bark yields a long, soft, and silky fibre, which is said to be one of the best produced in India.

NEILL, nēl, Charles Patrick (1865–). An American commissioner of labor, born at Rock Island, Ill. He studied at the universities of Notre Dame (Indiana) and Texas and graduated from Georgetown (A.B., 1891) and Johns Hopkins (Ph.D., 1897). He was an instructor at Notre Dame in 1891–94 and instructor and associate professor of political economy at the Catholic University (Washington, D. C.) from 1897 to 1905. Thereafter until 1913 he was United States Commissioner of Labor, served as Commissioner of Labor Statistics from March to May, 1913, and then became connected with the American Smelting and Refining Company at New York. He served also as vice president of the District of Columbia Board of Charities (1900–08), as assistant recorder of the Anthracite Strike Commission (1902), as recorder of the Birmingham (Ala.) Arbitration Board

(1903), and as member of the United States Immigration Commission (1907–10).

NEILL, Edward Duffield (1823–93). An American author and educator, born at Philadelphia. He attended the University of Pennsylvania for a time, but graduated at Amherst in 1842 and afterward studied theology at Andover. After ordination as a Presbyterian minister he removed to St. Paul, Minn., in 1848 and became pastor of the first Protestant church. In 1851–53 he was Superintendent of Public Instruction for the Territory and from 1858 to 1861 chancellor of the State university. In 1861–64 he was an army and hospital chaplain in the Civil War. From that time until 1869 he was one of the secretaries of Presidents Lincoln and Johnson. President Grant appointed him Consul to Dublin in 1869, but he returned the next year. In 1873–84 he was president of Manchester College in St. Paul and from that time until his death professor of history and literature. He published many historical works, chiefly concerning the Colonial period. They are drawn entirely from original documents and contain much valuable material, arranged, however, with little sense of proportion. The most important are: *History of Minnesota* (1858; 5th ed., 1883); *Terra Mariæ* (1867), a history of early Maryland; *History of the Virginia Company of London* (1869); *English Colonization of America during the Seventeenth Century* (1871); *Minnesota Explorers and Pioneers* (1881); *Virginia Vetusta* (1885); *Virginia Carolorum* (1886).

NEILL, James George Smith (1810–57). A British soldier, born near Ayr, Scotland. He studied at Glasgow University, became a cadet in the service of the East India Company in 1827, and from 1828 to 1852 served with the First Madras European Regiment. When the Second Burmese War broke out in 1852, he was appointed deputy assistant adjutant general on the staff of Sir Scudamore Steele. During the Crimean War in 1855–56 Neill was second in command of the Turkish contingent. Returning to India in 1857, he occupied Benares and Allahabad when the Indian Mutiny broke out, suppressing the mutineers at those places with the utmost severity. During the operations of Havelock's column about Cawnpore Neill failed to support loyally his superior officer, but in the final advance to Lucknow he commanded the right wing of Havelock's army. While leading a successful assault on the rebellious sepoys besieging Lucknow, he was killed.

NEILSON, nēl'son, (Lilian) Adelaide (1846–80). The assumed name of an English actress, Elizabeth Ann Brown. She was born in Leeds of poor parents, who moved to Guiseley. When 14 years old she ran away from home and, going to London, was educated for the stage through the kindness of a chance acquaintance, making her début in 1865 in the part of Juliet. She played for a few years in various theatres of London and the provinces till 1870–71, when she met great success as Amy Robsart in an adaptation of *Kenilworth* and as Rebecca in *Ivanhoe.* At once she became one of the favorites of the English stage and was equally popular in America, where she appeared nearly every year from 1872 to her death. Her great characters, besides those mentioned, were the Shakespearean Rosalind, Beatrice, and Imogen, and also Julia in *The Hunchback.* Early in her career she was married to Philip Lee, from whom she was divorced in 1877. She died suddenly in Paris when at the height of her career. Consult: Marston, *Our Recent Actors* (London, 1890); Scott, *The Drama of Yesterday and To-Day* (ib., 1899); William Winter, in *Other Days* (New York, 1908) and *The Wallet of Time,* vol. i (ib., 1913).

NEILSON, James Beaumont (1792–1865). A Scottish inventor, born at Shettleston, near Glasgow. He had little education in school and at 14 was set to work. He was first employed by his brother near Glasgow, later as engineer of a colliery near Irvine, and in 1817 as foreman of the Glasgow gas works, with which he remained for 30 years. There he made many improvements in gas manufacture, including the use of clay retorts and of sulphate of iron as a purifier, and founded an institute for the education of employees. His great invention, that of the hot blast in manufacturing iron, was directly opposed to the belief of contemporary foundrymen that the colder the blast the better the quality and the greater the quantity of iron produced, and his experiments were long blocked by the impossibility of a fair test. Neilson's patents, taken out in 1828, were very successful. With equal fuel his method produced three times the iron of the cold blast. But the validity of the patents was attacked with some success, and many firms refused to pay the license for the blast. Neilson won the great suit against the Bairds of Gartsherrie in 1843 and four years afterward retired to the Isle of Bute. His last years were spent at Queenshill, Kirkcudbright, where he established a workingman's institute. See Iron and Steel, Metallurgy of.

NEILSON, John (1776–1848). A Canadian journalist and statesman. He was born in Kirkcudbrightshire, Scotland, went to Lower Canada in 1790, and seven years afterward became editor of the Quebec *Gazette,* the first newspaper ever published in Canada. It was printed both in French and in English and under his direction became an influential organ of public opinion. Neilson was elected a Liberal member of the Lower Canada Assembly in 1818 and identified himself strongly with the cause of the French Canadians, not in encouraging separation or rebellion, but in contending by constitutional means against any encroachment upon their rights and privileges. In 1822, along with Louis Joseph Papineau (q.v.), he was a delegate to England to oppose the contemplated union of Upper and Lower Canada, and in 1828 and 1834 he went again to England on the same mission. After the Act of Union was passed in 1841 he still remained opposed to it, and its subsequent history largely vindicated his course. He was elected a member of the Canada Legislative Assembly in 1840 and later was offered, but declined, the speakership of the Legislative Council. In 1844, however, he became a member of that body. During the latter part of his life he was the real leader of the French Canadians, and though for many years the friend of Papineau, the latter's extreme course severed the ties that had long united the two men. Consult J. C. Dent, *The Last Forty Years* (Toronto, 1881).

NEILSON, Julia (1869–). An English actress, born in London. She studied music at Wiesbaden, Germany, and (1884–86) at the Royal Academy of Music, London. Her first appearance was as Cynisca in *Pygmalion and Galatea* in 1888. She married the actor Fred Terry (q.v.) and was joint manager with him

after 1900. She had played with Lewis Waller, Beerbohm Tree, John Hare, George Alexander, and others, at the Haymarket, Savoy, Adelphi, and St. James's in London, making a particular success as Rosalind in the phenomenal run of *As You Like It*, and toured Canada and the United States (1895, 1910). For her daughter, see TERRY, PHYLLIS NEILSON-.

NEILSON, SAMUEL (1761–1803). An Irish politician, founder of the United Irish Society. He was born at Ballyroney, County Down, the son of a Presbyterian clergyman, and established himself in Belfast as a woolen merchant, but his interest in politics soon forced him out of business. In 1792 he became editor of the *Northern Star*, an organ founded under the auspices of the United Irishmen. The formation of this society had been suggested by Neilson in the previous year and was carried out by Wolf Tone. The *Star* was suppressed in 1797 after the editor, who aimed at the establishment of a republican government and complete separation from England, had several times suffered arrest and imprisonment. Rearrested in 1798, Neilson either bargained with the government in behalf of all political prisoners that they were to be exiled to some country friendly to Great Britain, and in return would disclose the secrets of the United Irish Society, or in some other way managed to escape trial. In 1802 he was set free at Cuxhaven, soon afterward came to the United States, and died at Poughkeepsie, N. Y.

NEILSON-TERRY, PHYLLIS. See TERRY, PHYLLIS NEILSON-.

NEIRA (nā'ē-rà) **BANDA.** One of the Banda Islands (q.v.).

NEISSE, nī'se. A fortified town in the Province of Silesia, Prussia, on the Glatzer Neisse, 46 miles south-southeast of Breslau (Map: Prussia, G 3). The town proper on the right bank of the river is well built, with the interesting Gothic church of St. Jacob, dating from the fifteenth century, the Jesuit church, the church of the Cross, the Rathaus with its high tower, the bishop's residence, now used for municipal offices, and the Catholic Gymnasium, formerly a Jesuit college. The town has a Gymnasium, an archiepiscopal seminary, and a military academy, manufactures tapestry, furniture, machinery, cutlery, lace, and wire screens, and carries on a trade in sugar, wood, marble, and vegetables. Pop., 1900, 24,271; 1910, 25,938. Neisse was formerly the capital of the Principality of Neisse, which belonged to the bishopric of Breslau.

NEISSER, nīs'ĕr, ALBERT LUDWIG SIEGMUND (1855–1916). A German syphilologist. Born in Schweidnitz, German Silesia, he studied at the universities of Erlangen and Breslau (M.D., 1877). From 1878 to 1880 he was assistant at the university clinic at Breslau, in 1880 he was admitted to the medical faculty of the University of Leipzig as privatdocent, and two years later he returned to Breslau as assistant professor, where, in 1907, he was appointed professor of dermatology and syphilis. He traveled through the Scandinavian peninsula and Spain, studying leprosy, and through Java and Batavia. Neisser paid special attention to leprosy, gonorrhœa, and syphilis. Upon his discovery of the gonococcus (1879) he based the local treatment of gonorrhœa, which is now universally used. His writings treat the fields of leprosy, gonorrhœa, and syphilis and amount to more than 100 essays. Among them may be mentioned: "Weitere Beiträge zur Aetiologie der Lepra" (1881); "Ueber Iodoform Exantheme" (1884); "Ueber die Ansteckungsfähigkeit der chronischen Gonorrhoe" (1886); "Ueber Therapie der Syphilis" (1886); "Ueber die Mängel der zur Zeit üblichen Prostituirtenuntersuchung" (1890); "Wann und wie sollen wir die Gonorrhoe behandeln?" (1890); *Die Einreibungskur* (1897); "Ist die Syphilis heilbar?" (1903); *Atlas seltener . . . Hautkrankheiten* (1906–07), with E. Jacobi; "Ueber das neue Ehrlichsche Mittel" (1910); "Bemerkungen zur Lupus Bekämpfung" (1913).

NEITH, nē'ĭth. One of the most ancient of the Egyptian goddesses, worshiped especially at Sais in the delta. She is mentioned in some of the most ancient inscriptions, but did not attain any special prominence until the time of the twenty-sixth dynasty, which originated in Sais. Neith is represented as a woman wearing the crown of Lower Egypt and holding in her hand a bow and arrows, together with the sceptre of a goddess. In late times it seems certain that she was regarded as a form of Hathor. In earlier times, says Budge, "she was certainly a personification of a form of the great, inert, primeval watery mass out of which sprang the sun god Ra." It is probable that she was originally a Libyan divinity. Consult: Mallet, *Le culte de Neit à Sais* (Paris, 1889); W. M. Flinders Petrie, *Nagada and Ballas* (London, 1896); Alfred Wiedemann, *Religion of the Ancient Egyptians* (Eng. trans., New York, 1897); E. A. T. Wallis Budge, *The Gods of the Egyptians* (2 vols., London, 1904).

NEITHARDT VON GNEISENAU, nīt'härt fôn gnī'ze-nou. See GNEISENAU, AUGUST.

NEITZEL, nīt'sel, OTTO (1852–). A German music teacher and composer, born at Falkenburg, Pomerania. He studied in Kullak's Academy in Berlin and also at the university there (Ph.D., 1875). He became pianist for Pauline Lucca and Sarasate; served as conductor of the Musikverein at Strassburg in 1878–81 and also conducted in the City Theatre there in 1879–81; and taught at the Moscow Conservatory in 1881–85 and thereafter at the Cologne Conservatory. In 1887 he became musical critic of the *Kölnische Zeitung*. His operas, *Angela* (1887), *Dido* (1888), and *Der alte Dessauer* (1889), were fairly successful, and he published *Führer durch die Oper des Theaters der Gegenwart, Text, Musik, und Scene erläuternd* (3 vols., 1890–98); *Beethovens Symphonien nach ihrem Stimmungsgehalt erläutert* (1891); *Camille Saint-Saëns* (1899); *Musikästhetische Betrachtungen* (1909), with Ludwig Riemann.

NEIVA, nā'ē-vȧ. The capital of the Department of Huila, Colombia, on the right bank of the river Magdalena, at the head of navigation for light craft, and 112 miles southwest of Bogotá (Map: Colombia, B 3). It is the chief centre for commerce for south Colombia, is celebrated for its cacao, and has an export trade in cattle. There are minor industries in silk weaving and in the manufacture of hats. Its former trade in cinchona has largely disappeared through the destruction of the trees. Neiva was founded in 1550 and 19 years later destroyed by the Indians. It was rebuilt in 1612 on its present site. Pop., 1912, 21,852.

NEJD, or **NEDJED,** nĕj"d. A region of Arabia, lying between lat. 24° and 27° N. and bounded by El Hasa on the east and Hedjaz on the west (Map: Asia, F 6). It has a hilly

surface, 2500 to 5000 feet, intersected by many streams, which dry up during the summer. The climate is healthful. Politically Nejd is a dependency of Jebel Shammar. The inhabitants are Wahabis and are estimated at 1,000,000.

NEJIN. See NEZHIN.

NEKHBET, nĕk'bĕt. An Egyptian deity, the local divinity of the city of Eileithyia (q.v.).

NEKRASOV, nyĕ-krä'sôf, NIKOLAI ALEXEIEVITCH (1821–78). A Russian poet, born in the Government of Podolia. At 16 he left the Yaroslav Gymnasium and was sent to St. Petersburg to enter the Regiment of Nobles. He matriculated at the university in 1839, whereupon his father cast him off. For three years he suffered fearful privations, until a tutorship in a preparatory school and some hack work for periodicals improved his material circumstances. In 1840 he produced a volume of verse which was not well received. He was more fortunate with two prose volumes, published in 1845 and 1846, which met with Belinski's praise. In 1847 he bought the *Contemporary* (*Sovremennik*), which soon became the most popular monthly in Russia. The years between 1856 and 1866 were the most brilliant period in his literary activity. Until then despondent and doubting, he now shared the hopes aroused by the great reform movement. When the *Contemporary* was suspended, Nekrasov edited the *Annals of the Fatherland.* His works depict the downtrodden and oppressed of all classes of Russian society. The racy, idiomatic language of the poet, the vividness of his imagery, and the caustic power of his satire are tremendously impressive. On the other hand Nekrasov is not wholly free from artificiality and exaggeration and is deficient in form. His *Red-Nosed Frost, Fatherland, Peasants' Children,* and *Last Songs* are among the most touching of his poems. The long poem (5000 verses) *Who Lives Happily in Russia?* written in an unusual metre, is sometimes diffuse in the treatment of the whole life of the whole nation, but the greater part of it is admirable. He died Jan. 8, 1878. His works have been published at St. Petersburg in two volumes (10th ed., 1909). Wiener, *Anthology of Russian Literature,* vol. ii (New York, 1903), contains a list of English translations of Nekrasov's poems. Consult Rosa Newmarch, *Poetry and Progress in Russia* (New York, 1907; with translations), and the monographs of Pypin (St. Petersburg, 1905) and Pokrovski (Moscow, 1906).

NEKTON, nĕk'tŏn. See PALEONTOLOGY.

NÉLATON, nā'lä-tôN', AUGUSTE (1807–73). A French surgeon, born in Paris. He received his doctor's degree in 1836, from 1839 until 1851 was adjunct professor in the Faculty of Paris, and from the latter year until 1867 was professor of clinical surgery. In 1866 he became physician to the Emperor and in 1868 a Senator. He was elected a member of the Institute in 1869. Nélaton was one of the most skillful operators of his time, especially in lithotomy, and made several important improvements in surgery, one of which, a probe, having an unpolished porcelain knob at its end, much used in military surgery in searching for bullets, is called Nélaton's probe. His principal work is *Eléments de pathologie chirurgicale* (1844–49; 2d ed., 1868–85). Among his other works may be mentioned *Recherches sur l'affection tuberculeuse des os* (1837).

NE'LEUS (Lat., from Gk. Νηλεύς). A son of Poseidon and brother of Pelias. Having been exposed by their mother, the brothers were found and brought up by a herdsman and when grown up were recognized by their mother, Tyro, who had married Cretheus of Iolcus in Thessaly. After Cretheus's death they quarreled over the possession of Iolcus, and Neleus withdrew to Pylos in Messenia. Because Neleus refused to purify Heracles after the murder of Iphitus, Heracles killed all Neleus's sons except Nestor. According to one account Neleus perished with his sons. He is also said to have reëstablished the Olympic Games and to have died at Corinth. See also MELAMPUS.

NELIDOV, nĕl'ĭ-dôf, ALEXANDER IVANOVITCH (1838–1910). A Russian diplomat, member of an old aristocratic family. He was born in the Kishinev District and studied law and Oriental languages at the University of St. Petersburg. Entering the diplomatic service (1855), he was secretary successively to the Russian Ambassadors at Athens, Munich, and Vienna and in 1872 was appointed counselor to the Embassy at Constantinople. During the Russo-Turkish War of 1877–78 he directed the diplomatic office at the headquarters of the Russian army and took an active part in the negotiations which led to the Peace of San Stefano and later to the Treaty of Berlin. Nelidov was appointed Ambassador to Saxony (1879). Between 1883 and 1897, while Ambassador to Turkey, he took a prominent part in the settlement of the Armenian question and in the adjustment of the Balkan difficulties and did a great deal to strengthen the influence of Russia at Constantinople. From 1897 to 1903 he was the Russian Ambassador at Rome and from 1903 to his death Ambassador to France. He played a considerable part in settling the famous Hull incident during the Russo-Japanese War.

NELIGH, nē'lĭg. A city and the county seat of Antelope Co., Neb., 153 miles northwest of Omaha, on the Elkhorn River and on the Chicago and Northwestern Railroad (Map: Nebraska, G 2). It has a Carnegie library and a beautiful park with a fine bathing beach. The city is the commercial centre of a large agricultural and stock-raising region. Alfalfa, corn, and fruit are extensively cultivated in this vicinity. The industrial establishments include alfalfa and flour mills, a grain elevator, a creamery, cement-block, brick, and chicken-food factories, and marble and granite works. Pop., 1900, 1135; 1910, 1566.

NELLORE, nĕl-lōr', or **NELLUR,** nĕl-lo͝or'. The capital of a district, Madras, British India, situated on an elevation on the right bank of the Pennair River, 8 miles from its mouth and 96 miles north-northwest of Madras (Map: India, D 6). It is an irregularly built town, is the seat of several European missions, and has dyeing and rice-husking establishments. One of the features of the vicinity is the anicut, 677 yards long, the chief irrigation work on the Pennair. The town has a good water supply. The ancient Sinhapur (lion city) was formerly an important fortress. The discovery in the ruins of a Hindu temple, at the end of the eighteenth century, of a pot filled with second-century Roman gold coins and medals, chiefly of Trajan, Adrian, and Faustina, would point to a remote origin. Pop., 1901, 32,040; 1911, 33,246.

NEL'SON. A municipal borough and manufacturing town in Lancashire, England, 3½ miles north-northeast of Burnley. Besides coal mining it has considerable manufactures of cotton,

worsted, and silk. It contains a handsome town hall, a market hall, a library, and a technical school. In 1850 it was a small village named after a roadside inn; its manufactures inaugurated its prosperity, and it was incorporated in 1890. It owns its water, gas, and electric-lighting plants, market, and cemetery. Pop., 1901, 32,816; 1911, 39,479.

NELSON. The capital of a province of the same name in New Zealand, situated at the north end of South Island (Map: New Zealand, S. I., D 2). The harbor has a depth on bar of from 15 to 19 feet. The railway wharf can be reached only by vessels drawing 18 feet and under. Steamers periodically ply to Sydney and Melbourne. The manufactures of the town comprise cloth and leather goods. The centre of the town is a hill rising 40 feet above the surrounding streets and laid out as a square with an Episcopal cathedral in its centre. The city possesses a town hall, art gallery, museum, and several educational institutions of high grade and is the centre of a fruit and hop growing district. The city was founded in 1842. Pop., 1901, 7000; 1911, 9023. The provincial district of the same name contained, in 1911, 48,463 inhabitants.

NELSON. A city and the capital of Kootenay electoral district, British Columbia, situated on the Kootenay River, about 270 miles east (direct) of the city of Vancouver and on the Canadian Pacific and Great Northern railways (Map: British Columbia, E 5). It possesses a business college, an armory, and county buildings. It is the centre for the East and West Kootenay mining district, producing silver, gold, copper, lead, zinc, and coal. It is a divisional point on the Canadian Pacific Railway, which has railway repair shops and shipyards here. Industrial establishments include ironworks, cigar, box, jam, and mattress factories, saw and shingle mills, and manufactories of boats and launches. The city owns its hydroelectric light and power plant, gas and water works, and street railway. Pop., 1911, 4476; 1915, with suburb (local est.), 7500.

NELSON, Aven (1859–). An American botanist, born in Lee Co., Iowa, and educated at the State Normal School at Kirksville, Mo., at Harvard (A.M., 1892), and at the University of Denver (Ph.D., 1904). He served as an instructor at Drury College, Springfield, Mo., in 1883–85, as principal of public schools at Ferguson, Mo., in 1885–87, and as professor of botany at the University of Wyoming after 1887. Nelson had charge of laboratories at the Columbian Exposition in 1893 and at the Louisiana Purchase Exposition in 1904. His publications include: *Report on the Flora of Wyoming* (1896); *The Trees of Wyoming and how to Know them* (1899); *Key to Rocky Mountain Flora* (1902); *Spring Flora of the Intermountain States* (1910; new ed., 1912).

NELSON, Henry Loomis (1846–1908). An American economist and journalist, born in New York City. He was educated at Williams College, graduated from the Columbia Law School, and, admitted to the bar in 1869, practiced until 1878. From the latter year until 1885 he was Washington correspondent of the Boston *Post*, of which he was editor in 1885–86, was an editorial writer for the New York *World* in 1889, and served as editor in chief of *Harper's Weekly* in 1894–98. From 1902 until his death he was professor of political science at Williams. He is author of *John Rantoul* (1885), a novel; *Our Unjust Tariff Law* (1884); *The Money we Need* (1895); *The United States and its Trade* (1902).

NELSON, Horatio, Viscount (1758–1805). The most famous of English admirals. He was born at Burnham-Thorpe, Norfolk, England, on Sept. 29, 1758. His father was the rector of his native place, while his mother was a grandniece of Sir Robert Walpole. Nelson received only a meagre education, and at the age of 12 he entered the navy under the care of his maternal uncle, Captain Maurice Suckling. To this uncle he owed his early rapid promotion and the advice which led to his careful training in seamanship. During his first period of service he made voyages to the Arctic regions and to both the West and East Indies, and suffered considerably from ill health, for throughout life Nelson was very weak physically, and often was maintained only by sheer force of will. In 1777 Nelson was made second lieutenant, and again went to the West Indies. In 1779 he became captain, and henceforth promotion came to him only in due order, since the regulations did not allow any promotion other than according to seniority after the rank of captain.

In 1783, after the war with France and the American Colonies had closed, Nelson was for a short time put on half pay, but after a few months, part of which time was spent in France, he was appointed to the *Boreas*, on which he served in the West Indies until 1787. Here he performed his first notable service, which, however, brought him into conflict with his commander, Sir Richard Hughes, a well-meaning but timid man. Contrary to the latter's orders and in opposition to powerful interests in the West Indies, Nelson insisted upon enforcing the Navigation Acts against the United States and other foreign nations. He was ultimately upheld by the British government, but for the time it involved him in vexatious lawsuits and caused him much anxiety. While on this station Nelson first met at Nevis the widow of Dr. Josiah Nisbet, by birth a Miss Frances Woolward, whom he ultimately married on March 11, 1787, Prince William, afterward William IV, giving the bride away.

Soon after his marriage Nelson started for home, and on Nov. 30, 1787, he was relieved from active service. For some obscure reasons a coolness had sprung up between Nelson and the Admiralty, with the result that he remained in retirement until the threatened outbreak of the war with France in 1792 caused all officers to be recalled into active service. On Jan. 30, 1793, Nelson received command of the 64-gun ship *Agamemnon*, which, together with his last ship, the *Victory*, is most closely associated with his career. He served on it for over three years. He was assigned to the Mediterranean fleet, serving first under Admiral Hood, then under Hotham, and finally under Sir John Jervis (later the Earl of St. Vincent). Several times he was sent on diplomatic missions, and on the occasion of one to Naples in September, 1793, Nelson for the first time met Sir William Hamilton and his wife Emma, the Lady Hamilton who was to have later so great an influence over him. Nelson took an active part in Hood's conquest of Corsica, commanding the marines at Bastia and Calvi, where gravel driven by a cannonball destroyed the sight of his right eye. This period of his life Nelson always considered the happiest part of his career, and it prepared

him for the great events to come. In 1796 he was made a commodore and received a new ship.

At this time Napoleon was winning his great victories over the Austrians in Italy. The position of the British fleet in the Mediterranean was becoming precarious, as Spain was about to join France, in which case the English fleet would be greatly outnumbered. The hold of the British on Corsica was loosening, since, under the influence of the great French victories, the Republicans were becoming very active on the island. Taking all these things into consideration, the British government ordered Sir John Jervis to abandon Corsica, to withdraw from the Mediterranean, and return to England. These orders were received on Sept. 25, 1796, and Nelson had to superintend the work, though he considered it best for Great Britain to retain everything, since he believed the British fleet sufficiently powerful to cope with the enemy.

In December, 1796, Jervis sent Nelson back to the Mediterranean to aid in the removal of the naval stores from the island of Elba, which the British had retained at the time they had abandoned the other posts in that sea. As he was returning he had to pass through the whole Spanish fleet, and on Feb. 13, 1797, he had rejoined Jervis. The following day took place the great battle off Cape St. Vincent (q.v.). Here by his rapid and independent manœuvres Nelson did much to carry the day, and Jervis was magnanimous enough to give him due credit. The Spanish fleet of 27 ships was totally defeated by 15 vessels, and one of the chief naval resources of France had disappeared. As a reward for his share in this great event Nelson received a knighthood of the Bath, and before this he had become in due order of promotion a rear admiral of the blue. His next duty was to bring the troops away from Elba, a task which he promptly accomplished. It is interesting to note that though at this time the serious mutinies in the fleet at Spithead and the Nore took place, Nelson had no difficulty with his men, who assured him of their loyalty. For a few weeks Nelson served off Cadiz, and then, at his own suggestion, he was detached to make an attack on the town of Santa Cruz, on the island of Teneriffe, believing that large Mexican treasure ships had taken refuge there, whose capture would deal a severe blow to Spain. The expedition arrived at its destination on July 20, 1797, and the following day an attack was made. This assault and some later ones were all repulsed. The plan had never anything to recommend it but its boldness and a belief that the place was not strongly defended. Nelson himself fought with great heroism and lost his right arm, and, as the wound did not heal well, he was compelled to return to England, where he arrived Sept. 3, 1797. On September 27 he was invested with the Order of the Bath by George III in person, and at the same time a pension of £1000 a year was awarded him. At this time, on account of his ill health and a fear that he would never again be able to enter active service, his spirits were greatly depressed, but he revived at once when on March 29, 1798, his flag was again hoisted over a ship. On April 29 he rejoined the Earl of St. Vincent off Cadiz.

From this time a new period in Nelson's life begins. He soon becomes the great man of his service, instead of merely one of many distinguished naval officers. It is the period which opens with Abukir Bay and closes with Trafalgar. It is necessary to consider now the state of Europe at the time when Nelson rejoined the fleet. Austria had been compelled by Napoleon's victories in Italy to sign the Preliminaries of Leoben on April 18, 1797, which were ratified soon after by the Treaty of Campo-Formio (q.v.). This left England with only one weak ally, Portugal, while it set Napoleon free to attack England itself. He thought the best place to injure England would be in the East, and for this purpose prepared his great Egyptian expedition. (See NAPOLEON I.) The news of Napoleon's intentions soon reached St. Vincent, and in spite of the jealousy of some older officers, he detached Nelson to watch the French fleet and to check it. Nelson was unable to prevent it from getting to Egypt, and for months there was a weary hunt to find the French ships and compel them to fight. Finally, on Aug. 1, 1798, Nelson discovered them in the Bay of Abukir, and in the battle of the Nile that ensued the French fleet was completely defeated, and only two vessels escaped. Nelson received a wound on the head from which he suffered ever after. The brilliant victory practically insured the failure of Napoleon's expedition, since it cut him off from his base of supplies. Nelson was created Baron Nelson of the Nile, and received a pension of £2000 a year, besides other numerous gifts and compliments both from England and abroad. On August 19 he sailed from Alexandria and on September 22 he finally arrived at Naples.

The Neapolitan period of Nelson's life, which covered the ensuing two years, was the principal blemish on his career. Here began his criminal relations with the wife of the English Minister at Naples, Sir William Hamilton, which led to a complete separation of Nelson and his wife early in 1801. Moreover, Lady Hamilton influenced Nelson's public acts, so that for a time he behaved rather as commander in chief of the Neapolitan navy than as an English admiral. He induced Naples, however, to make war upon France, but the Neapolitan army was soon decisively defeated, and the royal family was compelled in December, 1798, to leave Naples, where the French proclaimed the Parthenopean Republic. After residing for a while with the Hamiltons at Palermo, and vexed for a time on account of the appointment of a junior officer, Sir Sidney Smith, to an important command in the Levant, Nelson was finally roused again to action on May 12, 1799, by the news that Admiral Bruix with the French Brest fleet had escaped from that harbor and was about to enter the Mediterranean. The danger was imminent that the French would recover the naval supremacy in the Mediterranean, which had been destroyed by the victory at Abukir Bay. Nelson prepared for the emergency with his usual ability, when, to his disgust, Jervis resigned his command and was succeeded by Keith, an honest but by no means brilliant officer. Friction between him and Nelson existed from the start. On June 24, 1799, Nelson appeared before Naples, intent upon securing that city before the French fleet should appear. He found that the Republicans had complete control and were aided by a Neapolitan squadron under Commodore Caraccioli. The Neapolitan admiral was captured on June 29, and Nelson, as commander in chief of the Neapolitan navy, immediately ordered a court-martial,

which sentenced the Commodore to death, and he was executed at once. Nelson has often been blamed for this action—for not keeping within his proper jurisdiction as the representative of Great Britain, and for not proceeding with more deliberation. The forts of the city had surrendered on June 26. At this time Nelson was created Duke of Bronte by the despicable Ferdinand IV of Naples. To the influence of Lady Hamilton, who was the intimate of the Queen of Naples, must be charged the serious disobedience of orders by Nelson shortly after. He had been ordered to join Lord Keith and to assist him to meet a large French fleet, but he preferred to remain at Naples. The danger, it is true, was averted; for on Aug. 13, 1799, the French fleet reëntered Brest, but had Nelson come up in time it is just possible that another great victory might have been won. For a short time Nelson was commander in the Mediterranean, but he displayed no enthusiasm for his work. On Jan. 20, 1800, he united his command with that of Keith, and after several quarrels Nelson was finally recalled by orders which reached him in June. He traveled overland with the Hamiltons, and, though he was received everywhere with great enthusiasm, his conduct gave great cause of scandal to his friends. On Nov. 6, 1800, the party arrived in England, and soon after Nelson's final breach with his wife took place.

On Jan. 1, 1801, Nelson became vice admiral by seniority and was assigned to the command of Sir Hyde Parker, who was to coerce the Northern Confederation. This league, composed of the states on the Baltic, had been maintaining an armed neutrality, which in truth was only a veiled attempt to aid Napoleon. Nelson advised an attack on the strongest member of the confederacy, Russia; but his daring plan was not followed, and instead the whole fleet sailed for Denmark. In a bold assault on the Danish fleet at Copenhagen, Nelson was victorious (April 2, 1801), and the Danes were compelled on April 9 to sign an armistice, which tied their hands, but left the English free. It was during the engagement of April 2 that Nelson, having received an order early in the day to cease action, placed his telescope to his blind eye and said, "I really do not see the signal." On May 5, 1801, Nelson was appointed commander in chief in place of Parker. He immediately proceeded to carry out his plan of attacking Russia, but found, when he arrived at Revel, that the Czar Paul had been murdered on March 24, and his son and successor, Alexander I, was preparing to follow another policy. For his services in this campaign Nelson was created Viscount. He returned to England and lived with the Hamiltons. After some slight service in the Channel, the Peace of Amiens closed the war, and on Oct. 22, 1801, Nelson left his ship.

Peace, however, proved of short duration, and on May 18, 1803, Nelson raised his flag on the *Victory* as commander in chief of the Mediterranean fleet. For two years he blockaded Toulon and kept a watchful eye on affairs, but Villeneuve escaped from Toulon with the French fleet on March 30, 1805. Napoleon was preparing at Boulogne to invade England, and for this purpose the different French fleets were to unite and cover the expedition. A most exciting chase followed, in which Nelson pursued Villeneuve to the West Indies and back to the coast of Spain, but the French admiral was unable to elude Nelson and the other English admirals long enough to give Napoleon any opportunity of crossing the Channel. Villeneuve finally put in at Cadiz, and Napoleon marched against Austria, which had declared war against him. Thus England was saved.

Nelson now blockaded Villeneuve at Cadiz, but Napoleon was threatening to disgrace his admiral for not fighting, and consequently, when Nelson had to send six vessels to Gibraltar for water, Villeneuve seized the opportunity and started to leave his shelter on Oct. 19, 1805, and on October 21 took place the famous battle off Cape Trafalgar (q.v.). Before beginning battle Nelson gave his now famous signal, "England expects that every man will do his duty." The victory was complete, but Nelson was mortally wounded, and died on the afternoon of Oct. 21, 1805, with the words "Thank God, I have done my duty." By his final great victory he had destroyed the combined French and Spanish fleets, and Napoleon's hope of creating a naval power vanished forever. Nelson thus contributed immensely to the final destruction of the Napoleonic ambitions, for without the control of the sea England would have been unable to wage her long contest. Nelson was buried in St. Paul's Cathedral, London, on Jan. 9, 1806, amid extraordinary public demonstrations, and in 1849 an imposing monument to his memory was completed in Trafalgar Square.

Bibliography. For many years the standard biography of Nelson was that by Robert Southey, popular and unreliable, first published in 1813, with many later editions, a good one being in Everyman's Library (New York, 1908), which contains a bibliography; this has been superseded by the sympathetic and reliable work by A. T. Mahan, *The Life of Nelson, the Embodiment of the Sea Power of Great Britain* (Boston, 1899). Consult also: J. K. Laughton, *Letters and Despatches of Horatio, Viscount Nelson* (London, 1886); J. C. Jeaffreson, *Lady Hamilton and Lord Nelson* (ib., 1888); id., *The Queen of Naples and Lord Nelson* (ib., 1889); G. L. Browne, *The Public and Private Life of Horatio, Viscount Nelson, as Told by himself, his Comrades, and his Friends* (ib., 1891); W. H. Fitchett, *Nelson and his Captains* (ib., 1902); J. K. Laughton, *Nelson* (ib., 1904); id., *Nelson and his Companions in Arms* (ib., 1905); White and Moorhouse, *Nelson and the Twentieth Century* (ib., 1905); M. E. Matcham, *The Nelsons of Burnham Thorpe . . . Compiled from Unpublished Letters and Notebooks* (ib., 1911); E. H. Moorhouse, *Nelson in England: A Domestic Chronicle* (New York, 1913).

NELSON, KNUTE (1843–). An American lawyer and legislator, born near Bergen, Parish of Voss, Norway. After his father's death he was brought by his mother to the United States in 1849. The family settled first in Chicago, the next year moving to Wisconsin. Nelson attended the Albion Academy; fought in the Civil War, being wounded and taken prisoner at Fort Hudson, La.; was admitted to the bar in 1867. During the next two years he was a member of the Wisconsin Legislature. After removal to Alexandria, Minn. (1871), he was for three years attorney for Douglas County, State Senator (1875–78), and presidential elector (1880). Elected to the Federal House of Representatives in 1882 and twice reëlected, Nelson showed his independence of party control by voting for both the Mills and

the Morrison tariff bills, although they were Democratic measures. On his retirement and resumption of practice, he became interested and employed in numerous complicated land cases, and he later prepared exhaustive treatises on the law governing public lands. In 1892 he was elected Governor of Minnesota, and in 1894 he was reëlected with increased plurality, having had a conspicuously successful administration. Before the end of his second term he was selected to succeed W. D. Washburn as United States Senator; and he was reëlected in 1900, 1906, and 1912. As Senator, Nelson soon took standing as one of the foremost Republican leaders. Probably his most important contribution to legislation was the act creating the Department of Commerce and Labor.

NELSON, Reuben (1818–79). An American Methodist Episcopal clergyman, educator, and publisher, born at Andes, N. Y. He entered the ministry in 1842. From 1840 to 1844 he was principal of Otsego Academy at Cooperstown, N. Y., and then, except for a year when he was presiding elder, for 28 years was the first principal of Wyoming Seminary, at Kingston, Pa. In 1872 he was elected one of the agents of the Methodist Book Concern in New York, and treasurer of the missionary society of his church, continuing to serve in both positions until his death. He was secretary of the Wyoming (Pa.) Conference for 10 years and a member of several General Conferences.

NELSON, Samuel (1792–1873). An American jurist, born at Hebron, Washington Co., N. Y. He graduated at Middlebury College, Vermont, in 1813. He then read law, removed to New York State, where in 1817 he was admitted to the bar, and began practice at Cortland. In 1820 he was a presidential elector on the Democratic ticket. His long judicial career of half a century began in 1823, when he was appointed by Governor Yates a judge of the State Circuit Court. In 1831 he was promoted to be an associate justice of the New York State Supreme Court, and in 1837, by appointment of Governor Marcy, he became Chief Justice of the court in succession to Judge Savage. In 1845 he was nominated by President Tyler as an associate justice of the Supreme Court of the United States. Although he concurred with Chief Justice Taney in the "Dred Scott" decision in 1857, and disapproved of the President's exercise of "war powers" during the Civil War, his loyalty was never questioned, and he was frequently consulted by Lincoln in judicial matters. He ranks as one of the greatest American authorities on admiralty and maritime law, and his prize-court decisions during the Civil War are of the utmost importance. In 1871 he was appointed by President Grant as one of the Joint High Commission for the settlement of the Alabama claims (q.v.).

NELSON, Thomas (1738–89). An American patriot, one of the signers of the Declaration of Independence. He was born at Yorktown, Va., and was the son of William Nelson, Governor of Virginia in 1770–71. He went to England in 1753, was educated at Eton and at Trinity College, Cambridge, and returned to his home at Yorktown in 1761. He was a delegate for several terms to the House of Burgesses, and served in the Provincial Conventions of 1774, 1775, and 1776, introducing in the last the resolution by which Virginia's delegates to Congress were instructed (May 15) to propose a declaration of independence. From August, 1775, until May, 1777, when he was forced by ill health to resign, he was a delegate to the Continental Congress, and signed the Declaration of Independence. In 1775 he was for a time colonel of the Second Virginia Regiment, and from August, 1777, until late in 1782, he commanded the Virginia State forces, rendering valuable service at the siege of Yorktown (1781), where he showed his patriotism by ordering the gunners to fire upon his own mansion, supposed to be the headquarters of Cornwallis. In 1779 he again sat for a time in Congress, and was again forced by ill health to resign; in 1780 he raised a large sum of money, on his own security, for the State, and paid out of his own pocket the arrearages of two Virginia regiments ordered South; and in the spring of 1781 he succeeded Jefferson as Governor of Virginia, though he resigned in November. Impoverished by his liberal advances to the State during the war, he passed his last years in very straitened circumstances, and much of his property was sold to pay public debts, for which he was security.

NELSON, William (1825–62). An American naval officer and soldier, born in Maysville, Ky. He entered the United States navy in 1840, and in 1847 commanded a battery at the siege of Vera Cruz. He subsequently served in the Mediterranean and South Pacific, was promoted to the rank of master in 1854 and to that of lieutenant in 1855, and in 1858, as commander of the *Niagara*, transported to Africa the negroes who had been rescued from the slave ship *Echo*. In 1861 he was on ordnance duty at Washington, and at the outbreak of the Civil War he was placed in command of the gunboats on the Ohio, with the rank of lieutenant commander. He left the navy soon afterward, entered the military service, was ordered to Kentucky, and there established recruiting stations, and organized camp Dick Robinson, near Danville, and a similar rendezvous at Washington, in Mason County. In September, 1861, he became a brigadier general of volunteers, and at the battle of Shiloh (April 6–7, 1862) he commanded the second division under General Buell. (See Shiloh, Battle of.) He was wounded in the engagement at Richmond, Ky.; was in command at Louisville, Ky., in 1862, when the Confederate general Bragg threatened that city, and in July of this year was commissioned major general of volunteers. On September 29 he was fatally shot at the Galt House, Louisville, by the Federal general Jefferson C. Davis, in a personal quarrel.

NELSON, William Rockhill (1841–1915). An American newspaper proprietor and editor, born at Fort Wayne, Ind. He was educated at Notre Dame University, Indiana, studied law, and was admitted to the bar. In 1876 he was campaign manager of Samuel J. Tilden in Indiana. He accumulated a fortune of $200,000 as a contractor, but lost most of it in an unfortunate cotton-growing enterprise in Georgia. An interest which he had acquired in the Fort Wayne *Sentinel* in 1876 he sold four years later, and then founded with S. E. Morss, who retired a few months later, an evening daily, the Kansas City *Star*. In 10 years the *Star* had a daily circulation of 50,000, and under Nelson's personal direction and editorship it came to have considerable influence throughout the country. When the Kansas City *Times* failed in 1901,

Nelson bought that paper and continued it as a morning edition of the *Star*. The two papers soon reached a combined circulation of 200,000, under a policy which Nelson himself described as "independent, but never neutral."

NELSON, Wolfred (1792–1863). A Canadian physician and political leader. The son of an English officer, he was born at Montreal. In 1811 he began the practice of medicine in St. Denis. In the war with the United States (1812–14) he served as surgeon. In 1827 he was elected Reform member for the Borough of William Henry in the Legislative Assembly of Lower Canada, where he labored faithfully to secure constitutional redress of the political grievances under which the people of that province suffered. Yielding later to the influence of L. J. Papineau (q.v.), he took a leading part in the rebellion of 1837, and was in command at the victory obtained by the insurgents at St. Denis, on the Richelieu River, but was captured and banished to Bermuda by Lord Durham (q.v.). Released in October, 1838, after the British government had declared Durham's decree of banishment illegal, Nelson settled at Plattsburg, N. Y., in the same year, and in 1842, after the declaration of a general amnesty, returned to Montreal. He was elected for Richelieu County to the Legislative Assembly of Canada in 1844 and 1845, and in 1851 was made inspector of prisons, a position which he held for several years. He served as mayor of Montreal two terms, and was at the head of the Lower Canada College of Physicians and Surgeons. Nelson was for many years a contributor to the medical press of Canada and the United States. He died in Montreal. Consult J. C. Dent, *Canadian Portrait Gallery* (1880), and *Canada since the Union of 1841* (Toronto, 1881).

NELSON RIVER. The principal river in the Province of Manitoba, Canada, forming the lower course of the Saskatchewan (q.v.) (Map: Canada, L 5, M 5). It flows from the north end of Lake Winnipeg at Norway House, first northward, through a series of lakes, then northeastward, into Hudson Bay at Port Nelson and York Factory, emptying through the estuary of Port Nelson after a course of about 400 miles. It is deep, wide, and swift, discharging an enormous volume of water; rapids and falls in its upper reaches limit its navigation by steamers to from 80 to 90 miles, though boats can ascend 127 miles from its mouth.

NELSON'S FARM, Battle of. See Frazier's Farm, Battle of.

NELSON'S MONUMENT. A granite column in the centre of Trafalgar Square, London, copied from a Corinthian column of the temple of Mars Ultor, in Rome, and crowned with a statue of Nelson, 17 feet in height, by Edward H. Baily (q.v.). The shaft, 145 feet high, was erected in 1843 by voluntary subscriptions. The pedestal bears bronze reliefs, cast from French cannon, depicting scenes from Nelson's life. At the foot of the column are four colossal bronze lions, by Sir Edwin Landseer.

NEL'SONVILLE. A city in Athens Co., Ohio, 62 miles by rail southeast of the State capital, Columbus, on the Hocking River and on the Hocking Valley Railroad (Map: Ohio, F 7). There is an important trade in coal, which is mined extensively in the vicinity, this being one of the most productive coal fields of the State. Nelsonville has brick, sewer-pipe, and clay works, and a large establishment which manufactures mining implements, car wheels, etc., and carries on a large repair business. The water works and electric-light plant are owned by the city. Pop., 1900, 5421; 1910, 6082.

NELUM'BO (Ceylonese name). A genus of aquatic plants similar to water lilies, belonging to the family Nymphæaceæ. The few species are found in the warm parts of Asia, North America, and the north of Africa. *Nelumbo nucifera*, with rose-colored flowers, is the Egyptian bean of Pythagoras, the lotus (q.v.) held sacred by the Hindus and by the people of Tibet, has been used as a food by the Egyptians from remote antiquity, and is much esteemed where it is cultivated, especially in China, for its edible seeds, roots, leafstalks, and flower stalks. The seeds resemble acorns in size and shape and have more delicate flavor than almonds. The root contains much starch, and Chinese arrowroot is said to be obtained from it. Great quantities are pickled with salt and vinegar and eaten with rice. When powdered, it makes excellent soup with water or milk. The ancient Egyptian mode of sowing this plant, by inclosing each seed in a ball of clay and throwing it into the water, is practiced at the present day in India. *Nelumbo lutea* is a North American species, with yellow flowers, which extends as far north as Ontario. The edible seeds, called water chinquapins, are sought for by children and others, and the farinaceous roots are agreeable when boiled. See Plate of Aquatic Plants.

NEMAGRAPTUS, nĕm'ȧ-grăp'tŭs (Gk. *νῆμα, nēma*, thread, from Gk. *νεῖν*, to spin + Gk. *γραπτος, graptos*, written on, marked). A genus of graptolites, including the forms earlier known as *Cœnograptus* and *Stephanograptus*, found in fossil condition in the early Ordovician shales, especially the Normanskill, and of world-wide distribution. It possesses a sigmoidal curved main stem from which numerous branches diverge, a form very graceful in outline. Its principal species is *Nemagraptus gracilis*.

NEMA'LION (Gk. *νῆμα, nēma*, thread, from Gk. *νεῖν, nein*, to spin + -lion). A genus of the red algæ (Rhodophyceæ, q.v.), including marine forms, usually branching filaments, much simpler in structure and in life history than most of the red algæ. For this reason it is a very common form described in textbooks and used in laboratories.

NEM'ATHELMIN'THES (Neo-Lat. nom. pl., from Gk. *νῆμα, nēma*, thread + *ἕλμινς, helmins*, worm). A large and important phylum of the unsegmented worms, of a more or less elongated cylindrical form and known as roundworms. Their skin is thick and strong and is usually wrinkled, giving the body a slightly annulated appearance, which, however, disappears if the animal is placed in water. The nervous system in the higher forms consists of two lateral ganglia at the anterior extremity, which are united by a nervous ring, and from which two nervous trunks, one dorsal and one ventral, proceed to the posterior part of the body. In the lower forms the dorsal cord is wanting, or else the ventral cord is wanting and there are two lateral cords. Special organs of sense are rarely met with; but a general sense of touch exists, and a few of the free-living species have two simple eyespots. The digestive organs are extremely simple. No blood system

nor distinct respiratory or excretory organs can be detected. These worms are unisexual; but the males are comparatively rarely found and are always smaller than the females. With the exception of the two families—the Enoplidæ, which are mostly marine forms, and the Anguillulidæ, or paste and vinegar eels—all the animals of this class are parasitic.

This phylum is divisible into three very distinct classes, viz., Acanthocephala, which have a protrusile proboscis armed with continuous hooks and are destitute of an intestinal canal; the Gordiacea, which possess an intestinal canal, but no anus; and the Nematoda, which usually possess a perfect intestinal canal, provided with two orifices. See ASCARIS; ENTOZOA; FILARIA; GUINEA WORM; PINWORM; ROUNDWORM; THREADWORMS; TRICHINA.

NEM'ATOCYST (from Gk. *νῆμα, nēma,* thread + *κύστις, kystis,* bladder). One of the lasso cells, thread cells, or nettling organs (*cnidæ*) of jellyfishes and other Cœlenterata, acting as organs of offense and defense. These bodies are embedded in the outer cellular layer or ectoderm of cœlenterates. A nematocyst is an oval, tough capsule, filled with a clear fluid, and invaginated at one end in the form of a hollow process which is prolonged into a long, coiled, hollow thread. The entire structure is developed in an interstitial cell called a cnidoblast, which, as it approaches maturity, migrates towards the surface and becomes embedded in one of the large ectoderm cells. At one point on its surface the cnidoblast is produced into a delicate protoplasmic process, the cnidocil or trigger hair. Any small animal on coming in contact with the lasso cells of a jellyfish is stung, benumbed, or poisoned by them. Upon contact with one or many of these lasso cells in the tentacles of a jellyfish or hydra, or a physalia, the cnidoblast suddenly contracts, and the pressure upon the stinging capsule causes an instantaneous eversion of the thread, at the base of which are minute sharp barbs. The threads also convey a poisonous fluid, which benumbs the victim. In this way sea anemones and coral polyps obtain their food, paralyzing and thus capturing quite large animals, even young fishes. These poison lasso cells also occur in certain Protozoa, mollusks, and in sponges, and in a modified form exist in the skin of certain worms, both terrestrial and aquatic. In these worms they are minute stiff rods, either coiled up in an irregularly spiral manner, or short and straight, contained in oval cells. They are shot out in great numbers when the animal is irritated, but are not retractile, being projected clear from the skin. That they are true nettling organs is proved by the fact that on touching the worms with the tongue they cause a tingling sensation. See illustration under CŒLENTERATA.

NEM'ATO'DA. A class of the phylum Nemathelminthes (q.v.), mostly parasites, but many others are extremely abundant in both fresh and salt water. They are the roundworms (q.v.), and a familiar example is found in *Ascaris* (q.v.). They are ranked in two orders—Nematoidea, in which the cœlom is not lined by epithelium, and Gordioidea, in which it is so lined. See HAIRWORM; NEMATHELMINTHES.

NEM'ATOG'NATHI (Neo-Lat. nom. pl., from Gk. *νῆμα, nēma,* thread + *γνάθος, gnathos,* jaw). An order of fishes. See CATFISH. Cf. PLECTOSPONDYLI.

NEMATOPHYTON, nĕm'ă-tŏf'ĭ-ton (Neo-Lat., from Gk. *νῆμα, nēma,* thread + *φυτόν, phyton,* plant). A gigantic fossil alga found in rocks of Devonian age in the eastern United States and Canada. The stem is of great size, often 40 feet long by 2 to 3 feet in diameter, and resembles the trunk of a tree to such extent that it was originally supposed to be the trunk of a conifer. This resemblance led Dawson to name it Prototaxites, or ancestral yew tree. The cellular structure is that of an alga. Several large trunks were uncovered near Monroe, Orange Co., N. Y., during 1897 to 1899. The type species is *Nematophyton logani.*

NEMAU'SUS. An ancient town of Gallia Narbonensis, now Nîmes (q.v.).

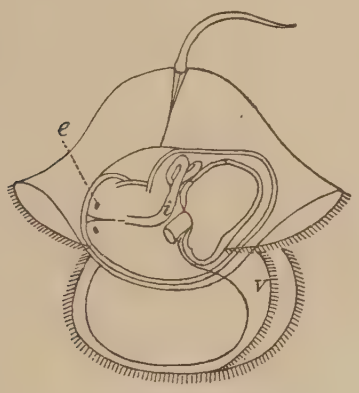
NĚMCOVÁ, nyĕm'tsŏ-vä, BOŽENA (1820–62). A Czech novelist, born in Vienna. She lived in Bohemia for many years, making a study of the life in its villages. The privations she had to endure for the last 10 years of her life do not seem to have dimmed her optimism or benevolence. *Babička* (Little Grandmother, 1855) is especially well known. It has frequently been translated into foreign languages, and was translated into English by Gregor in 1891. Her other works include: *Chydi lide* (Poor Folks, 1857); *Karla* (Charlotte, 1856); *Pohorská vesnice* (The Village in the Mountains, 1856). Her contributions to the study of Bohemian and Hungarian folklore in the volumes *Národní báchorky a pověsti* (1845–46) and *Slovenské pohádky a pověsti* (Slovak Folk Tales, 1858) are valuable. Her complete works, *Sebrané spisy,* were published in 1862–63. Consult Jakubec, *Geschichte der čechischen Litteratur* (Leipzig, 1907).

NE'MEA (Lat., from Gk. Νεμέα). The ancient name of a well-wooded valley of Argolis, in the Peloponnesus, between Cleonæ and Phlius. It lies north and south and is from 2 to 3 miles long and more than ½ mile broad. In it there was no town, but a sacred inclosure and temple of Zeus, of which three columns are still standing, while the others lie where they have been thrown by earthquakes. The valley was the seat of one of the four great national festivals of the Greeks—the Nemean Games, which were celebrated in midsummer every two years, at the beginning of the second and fourth years of each Olympiad. The first set of games in the historical period seems to have been held in 573 B.C., though legend ascribed the foundation of the games to the seven heroes on their march against Thebes, or to Hercules. The games consisted of the usual athletic contests, horse racing, and a competition for players on the cithara. The prize was a palm branch and crown of parsley. Consult E. N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910).

NEMEAN GAMES. See NEMEA.

NEM'ERTIN'EA (Neo-Lat., from Gk. Νημέρτης, *Nēmertēs,* name of a Nereid, from *νημερτής, nēmertēs,* unerring, from *νη-, nē-,* not + *ἁμαρτάνειν, hamartanein,* to miss). A class of flatworms easily distinguished from the Platodes by the proboscis and the presence of an anus. They are also remarkable for the prodigious length attained by some of the species, which, in the most extended state, is 10 or 12 feet, and one (*Linus longissimus*) reaches 90 feet. But the animal which so stretches itself out is capable of suddenly contracting itself to a quarter of that length. The nemertineans are

unsegmented worms, with a ciliated body epithelium, and are more or less dorsoventrally flattened. There is no distinct body cavity; the intestine is straight, with lateral diverticula: the anus is at the posterior end of the body. The blood, nervous, and excretory systems are all present and are usually very well developed. The only sense organs are little ciliated pits, possibly olfactory, and pigment eyes. The sexes are separate, and the larva goes through a complicated metamorphosis in most cases. One of the characteristic features of the nemertineans is the proboscis, lying above the œsophagus and opening from its cavity, just over the mouth. This proboscis may be used in the capture of food, which consists, to a large extent, of other sorts of worms. These worms twine themselves into knots and rolls, apparently inextricable, but without any real entanglement. A large number of species are known from all parts of the world. The great majority are marine, but a few are fresh-water, and land forms are known. The latter are all small and dull-colored, but the marine forms, besides being oftentimes very large, are frequently very gaudy, red and green being common colors. These worms usually pass through a metamorphosis; the prelarva is called a pilidium,



PILIDIUM OF NEMERTES.

The worm is shown growing within the larva: *v*, velum; *e*, eyes; *i*, intestine of the nemertinean worm.

which is helmet-shaped, with side lobes or lappets. A reduced form of the pilidium is called Desor's larva. The body of the pilidium is not entirely absorbed by the growing worm, but the worm develops within the larva, and finally frees itself, when the remnant of the pilidium dies. Certain forms have a direct development. Multiplication by transverse fission is frequent. Consult Shedson, in *Cambridge Natural History*, vol. ii (London, 1901).

NE'MESIA'NUS, Marcus Aurelius Olympius. A Carthaginian Latinist of the latter half of the third Christian century. He wrote poems called *Halieutica* (on fishing), *Nautica* (on aquatics), and *Cynegetica* (on hunting), of which the 325 lines preserved constitute what is apparently an introduction to the main work (edited by Baehrens in his *Poetæ Latini Minores*, vol. iii, 1881, and by Stern, together with Grattius Falicus, q.v., 1832), and four *Eclogæ*, reminiscent of Vergil, of Manilius, and most of all of Calpurnius Siculus, with whose poems they are so constantly found in manuscript that they long passed as his work (edited by Baehrens, as above, and by Schenkl, 1885; translated into English verse by Scott, 1891). The fondness of the author for the refrain and other points of similarity in style have suggested the attribution to Nemesianus of the *Pervigilium Veneris;* but this is entirely problematical. Consult W. S. Teuffel, *Geschichte der römischen Litteratur*, vol. iii (6th ed., Leipzig, 1913).

NEM'ESIS (Lat., from Gk. Νέμεσις, from *νέμειν, nemein*, to distribute. Others connect with Gk. *νεμεσίζεσθαι, nemesizesthai*, to feel just anger). A goddess of fate, who apportions to men their deserts. In Homer Nemesis does not appear as a person, though the word is used as a common noun in the sense of 'righteous anger,' a sort of personification of justice divine. In another early epic, the *Cypria* (q.v.), Nemesis was a goddess beloved by Zeus, whom she sought to escape by transforming herself into various animals. Finally the god approached her as a swan, and she brought forth an egg, which was found and kept by Leda, till in fullness of time Helen, the cause of the Trojan War, was born. Nemesis was worshiped at Smyrna in Ionia, where there seem to have been two goddesses of the same name, and especially at Rhamnus in Attica, where were two temples, an old one and a large new one erected in the period following the Persian wars. It contained a famous statue of the goddess by Agoracritos, the pupil of Phidias, of which the head is in the British Museum. According to Hesiod, Nemesis was the daughter of destructive night. She is the avenger of wrong, punishing especially vaunting pride, and in general any overstepping of the bounds of due moderation. Those who forget to humble themselves before the gods or who offend against the eternal laws are likely to fall under her power. In Alexandrian poetry Nemesis is frequently invoked to punish a cold or fickle loved one. At Rome, too, Nemesis was worshiped, e.g., by victorious generals and by gladiators. In art Nemesis appears as a dignified youthful figure, bearing frequently a measuring rod or an apple branch in one hand, and commonly drawing forward the upper seam of her tunic. In later art she is frequently winged, with a wheel at her feet, or a griffin at her side, or holding a bridle or a sword or a scourge. Consult: H. Posnansky, "Nemesis und Adrasteia," in *Breslauer philologische Abhandlungen*, vol. v (Breslau, 1890); L. R. Farnell, *The Cults of the Greek States*, vol. ii (Oxford, 1896); the article "Nemesis," in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iii (Leipzig, 1897–1909); P. E. More, "Nemesis, or the Divine Envy," in *The New World* (New York, 1899); Georg Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912).

NEME'SIUS (Lat., from Gk. Νεμέσιος, *Nemesios*). A Greek philosopher of the latter half of the fourth century A.D. He was Bishop of Emesa in Syria and wrote in Greek a treatise on *The Nature of Man*, an anthropological work combining Christian views with ideas gained from the Greek philosophers, especially Plato, in which he expressed his belief in the preeminence of the soul, the freedom of the will, and the indestructibility of matter. There is a passage in the book which has been interpreted as showing some understanding of the circulation of the blood. In Latin translation the work was much read during the Middle

Ages, and since then it has been translated into several of the languages of modern Europe. There is an edition by Matthaei (Halle, 1802). Consult Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii, part ii (5th ed., Munich, 1913).

NÉMETI, Szatmár-. See Szatmár-Németi.

NEMI, nā′mē. A beautiful lake in Italy, about 17 miles southeast of Rome, having on its margin a famous grove of Diana, east of the Alban Lake. It was anciently called Lacus Nemorensis and also Speculum Dianæ (Mirror of Diana). The grove of Diana was celebrated on account of its priest, who won his place by slaying his predecessor and held it till he was himself slain. The grove seems to have been situated on the northeast shore, near the modern village of Nemi. In the grove was a splendid temple (98 feet by 52); excavations made in the seventeenth and nineteenth centuries, and especially in 1905, have laid bare the temple and yielded many coins, ex-voto statuettes, inscriptions, etc. The lake fills the crater of an extinct volcano, is about 1100 feet above the sea, 4 miles in circumference, and has no outlet except a passage, 2 miles long, of unknown antiquity, which still serves its original purpose. It had long been known that there were remains of vessels sunk near the shore, but it was not till 1895 that these were satisfactorily examined. One seems to have been about 210 feet in length and 65 feet beam; the other measured 233 feet by 80. The decks were paved with thin slabs of porphyry and serpentine, and the railings were of gilded bronze. Lead water pipes with the name of Caligula furnished a clew to the date and seemed to imply fountains on board. Bronze beam heads and heads of lions, wolves, and a Medusa, with rings in their mouths for hawsers, have been recovered from these structures and removed to Rome. Though commonly called ships, it is far more probable that they were great rafts or boathouses used in some spectacle connected with the worship of Diana. Consult, for the antiquities, *Notizie degli Scavi* (Rome, 1895–96) and *Rivista Marittima* (1896–97). On the ritual of the grove, consult J. G. Frazer, *The Golden Bough*, parts i–iii (3d ed., New York, 1911).

NEM′OREN′SIS LA′CUS. See Nemi.

NEMOURS, *ne*-mo͝or′, Duke of. See family article Foix.

NEMOURS, Louis Charles Philippe Raphael d'Orléans, Duke de (1814–96). Second son of Louis Philippe. He was born in Paris and educated at the College of Henry IV. In 1831 he was elected King of the Belgians, but declined the offer. He served in the two Belgian campaigns and in Algeria and was in 1837 made lieutenant general. After the death of his elder brother, the Duke of Orléans (July 13, 1842), it was proposed to confer the regency upon the Duke de Nemours; but this was not sanctioned by public opinion, and he left France on the outbreak of the revolution in 1848 and did not return till 1871. After the adoption of the antiroyalist bill of 1886 his name was struck off the army list.

NENADOVITCH, nĕn′ä-dô′vĭch, Mateya (1777–1854). A Servian patriot. In 1793 he became a priest and later archpriest, or prota, of Valyevo, and hence is called Prota Mateya by Servians. When the Dahis, or leaders of the Janizaries, murdered Alexa Nenadovitch, the father of Prota Mateya, and other Servian leaders to prevent an uprising among the Serbs, Prota Mateya became one of the leaders of the resulting insurrection in 1804. In the following year Kara George sent him to St. Petersburg (now Petrograd) on a special mission, and thereafter he represented Servia diplomatically in Russia, Austria, Rumania, and Turkey. He defended his country's interests at the Congress of Vienna in 1814–15. His memoirs, *Memoari Prote Mateye Nenadovicha* (Belgrade, 1893), are a valuable source for the history of the Servian insurrections against the Turks.

NENANA (nä-nä′nä) **VALLEY.** A valley in the watershed of the Nenana River, a southwestern affluent of the Tanana River, Alaska, its principal fork—Jack River—rising in Broad Pass, about 2500 feet in height. The Nenana, formerly called the Cantwell, is a rapid stream which flows for miles through cañons walled in by cliffs several hundred feet high. Forage plants are good and abundant, game fairly plentiful, and considerable areas of spruce are found. The valley has become of special interest, owing to its forming part of the route of the government railroad, designated by President Wilson in April, 1915, between Seward, Kenai Peninsula (q.v.), and Fairbanks, via Broad Pass and Susitna valley (q.v.). Nenana valley possesses resources of great economic importance in its coal—lignite of somewhat inferior quality. The coal-bearing strata, stretching from the upper Nenana to the Delta River, exceeds 600 square miles in area, the largest field of interior Alaska. From outcroppings it is known that at least 66 square miles are underlaid by coal, with veins of considerable thickness. The rapid devastation, for mining purposes, of the forestal sections of the Tanana valley make it certain that the Nenana coal will become an important element in the industrial development of adjacent regions. Tentative plans have been advanced for the generation locally of electric power for transmission to Fairbanks, 75 miles distant. Gold placers have been discovered, but their exploitation has progressed slowly, owing to scarcity of water and cost of transportation.

NENA SAHIB, nā′nä sä′hêb. Leader in the Sepoy Mutiny in India. See Nana Sahib.

NENCIONI, nän-chō′nē, Enrico (1836–96). An Italian poet and critic, born at Florence. He was one of that literary company called the *amici pedanti*, of which Carducci was the leader. He wrote for the *Italia Nuova* and translated much French and English poetry into his language. Especially remarkable are his papers on English literature. Towards the end of his life he held a professorship at the Woman's Normal School in Florence. His works include: *Versi* (1880); *Medaglioni* (1883, 1897); *Studi di letterature straniere* (1897–98). Consult Croce, "E. Nencioni," in *La Critica* (Bari, January, 1906).

NENCKI, nĕn′kĭ, Marcel von (1847–1901). A Russian physician, born in Boczki in the Government of Kalish. He studied philosophy at Cracow, Jena, and Berlin and medicine at Berlin (M.D., 1870). In 1872 he joined the medical faculty at the University of Bern, becoming professor of physiological chemistry, and from 1891 was chief of the bacteriological institute in St. Petersburg. He introduced into medicine the use of salol (1886). Among his writings are *Zur Kenntniss der Skatolbildung* (1880); *Beiträge zur Biologie der Spaltpilze* (1880);

and the following contributions to medical journals, later reprinted—"Ueber die Zersetzung der Gelatine und des Eiweisses bei der Fäulniss mit Pankreas" (1876); "Untersuchungen über den Blutfarbstoff" (1885); "Ueber die chemische Zusammensetzung des russischen Nadelholztheers, etc." (1894), with N. Sieber; "Ueber die Rinderpest" (1897).

NENEBOJO. See MANABOZHO.

NEN'NIUS. An historian who lived in Wales at the end of the eighth and the beginning of the ninth century and who is believed by some to be the author of the *Historia Britonum*. Little is definitely known about him. The *Historia Britonum* contains a description of Britain and deals briefly with the period of the Roman occupation and the subsequent events, as the incursions of the Picts and Scots and the Saxon conquest. As an historical source it has little value, but it is of some importance for the study of early British mythology, especially for the study of the legend of Arthur and because it contains the genealogies of English kings to 796. The best edition is by Mommsen, in *Monumenta Germaniæ Historica: Auctores Antiquissimi*, vol. xiii (Berlin, 1898). For secondary works, consult Heinrich Zimmer, *Nennius Vindicatus* (Berlin, 1893), and Charles Gross, *Sources and Literature of English History* (New York, 1900).

NE'O-CELT'IC MOVEMENT. This phrase is loosely used to describe generically a variety of recent literary and scholarly activities—in Ireland, Scotland, Wales, Brittany, and elsewhere—concerned with the Celtic past or regarded as expressions of the Celtic spirit. It is also specifically applied, as, e.g., to the Celtic movement in late nineteenth-century Ireland, otherwise known as the Irish Literary Revival, which included scholars in and translators of Gaelic literature as well as Anglo-Celtic poets, dramatists, and story-tellers in whose brains and imaginations something of the distinctive old Celtic spirit seemed born again. It was sometimes used as a label, too, for the attempt at the revival of Irish as a spoken tongue organized as the Gaelic League and in full swing towards the end of the nineteenth century. Various applications of the phrase here in question are exemplified in William Sharp's introduction to *Lyra Celtica* (edited by Elizabeth A. Sharp, Edinburgh, 1896), and from the same anthology, with the introduction to it, some idea of the *personnel* of the Neo-Celtic Renaissance as a whole may be obtained. Conspicuous among those associated with the Neo-Celtic movement as it expresses itself in English are the Irish poet William Butler Yeats, the Irish dramatist J. M. Synge, the Scottish poet Fiona McLeod (William Sharp), and such translators or scholars as Kuno Meyer, Whitley Stokes, Alfred Nutt, Douglas Hyde, and Lady Gregory. See IRISH LITERATURE, *Irish Literature in English*.

NE'OCENE (from Gk. *néos*, *neos*, new + *καινός*, *kainos*, recent). A geologic term employed by the United States Geological Survey to designate the middle portion of American Cenozoic time and corresponding to the combined Miocene and Pliocene periods of the Lyellian classification. The latter is most generally followed at present, even in the United States. See TERTIARY SYSTEM.

NEO-DARWINISM. Although Darwin, in his *Animals and Plants under Domestication*, gave more weight to changes in the conditions of life, conceding that natural selection was not an exclusive factor in organic evolution, Wallace and others, notably Weismann, have insisted on the all-sufficiency of natural selection, pushing, as many think, Darwinism far beyond its legitimate bounds. See WEISMANNISM.

NEODESHA, nē'ō-dē-shä'. A city in Wilson Co., Kans., 13 miles by rail northwest of Independence, at the confluence of the Verdigris and Fall rivers and on the St. Louis and San Francisco and the Missouri Pacific railroads (Map: Kansas, G 8). The chief industrial plants are a zinc smelter, oil refinery, and brickworks. Neodesha has adopted the commission form of government. It owns its water works, sewage system, and electric-light plant. Pop., 1900, 1172; 1910, 2872.

NEODYMIUM, nē'ō-dĭm'ĭ-ŭm. A metallic chemical element isolated by Auer von Welsbach, in 1885, from a mixture of neodymium and praseodymium that had been regarded as an element and called *didymium*. Neodymium occurs in a number of rare minerals, including cerite, monazite, and orthite. It is separated from the concomitant elements either by fractional precipitation or by fractional crystallization of the nitrates. Neodymium (symbol, Nd; atomic weight, 144.3) is a pale-yellow metal that melts at 840° C. (1544° F.); it may be obtained by the electrolysis of fused neodymium chloride. Among the compounds of neodymium may be mentioned: the *oxide*, Nd_2O_3, which may be obtained by heating the nitrate or the oxalate; the *chloride*, $NdCl_3$, which may be obtained in the form of pink crystals by the action of hydrochloric-acid gas upon neodymium hydroxide; and the *nitrate*, $Nd(NO_3)_3.6H_2O$, which forms double salts with the nitrates of magnesium, rubidium, and ammonium.

NE'OGÆ'A (Neo-Lat., from Gk. *néos*, *neos*, new + *γαία*, *gaia*, earth). An alternative name in zoögeography for the continent of South America, or Neotropical region, in conformity with Arctogæa, Notogæa, and so on.

NEO-HEGELIANISM, nē'ō-hā-gā'lĭ-*an*-ĭz'm. A term often applied by opponents to the doctrine of those English, Scottish, and American thinkers who, more or less under the influence of Hegel, hold that consciousness and object are mutually implicated, and who, believing in the historical priority of the physical universe to the finite consciousnesses which are in some way correlated with physiological organisms, feel themselves forced to the conclusion that there is an eternal consciousness, of which the universe is the object. T. H. Green, J. and E. Caird, J. Watson, H. Jones, D. G. Ritchie, and Josiah Royce may be mentioned as prominent among those to whom the epithet is often applied. See especially GREEN, THOMAS HILL; ROYCE, JOSIAH. Consult Seth Pringle-Pattison, *Hegelianism and Personality* (Edinburgh, 1893), and the histories of philosophy by Falckenberg, Höffding, Thilly, Ueberweg-Heinze, and Windelband. See HEGEL.

NEO-KANTIANISM, nē'ō-kăn'tĭ-*an*-ĭz'm. A term applied to the doctrine of those followers of Kant who accept the general result of Kant's philosophy so far as the theory of knowledge goes, but do not follow Kant in his endeavor by practical reason to work out a metaphysics. F. A. Lange, H. Cohen, P. Natorp, J. Volkelt, and O. Liebmann may be mentioned as representatives of this tendency. Consult the his-

tories of philosophy by Höffding, Thilly, Ueberweg-Heinze, and Windelband. See KANT.

NEO-LAMARCK'ISM. The modified doctrine held by those naturalists who accept in the main the teachings of Lamarck (q.v.). Lamarck was the first truly scientific thinker to state in a detailed way the causes not only of the origin of species, but of certain types of animal life, such as some orders of birds, of the groups represented by the ai, lemur, the kangaroo, and so on. The chief Lamarckian factors of organic evolution (see LAMARCKISM) are changes in the environment, direct in plants and the lowest animals, indirect in the higher animals; also, the use and disuse of organs, and the transmission of characters acquired during the lifetime of the individual, or what is called use inheritance. The first writer after Lamarck, on the lines laid out by the great French zoölogist, was Herbert Spencer. In 1866–71, in his *Principles of Biology*, Haeckel claimed (1868) that we should have to adopt Lamarck's theory of descent for the explanation of biological phenomena, "even if we did not possess Darwin's theory of selection," adding: "The one is so completely and *directly proved* by the other, and established by mechanical causes, that there remains nothing to be desired."

In America, Cope (1866–71) and Hyatt (1866–74) independently advocated Lamarckian views. Cope first (1871) furnished what he considered as "an actual demonstration of the reality of the Lamarckian factor of use, or motion, as friction, impact, and strain, as an efficient cause of evolution." A. S. Packard (1871), by his studies of the embryology of *Limulus* and of cave animals, was led to adopt Lamarckian views in preference to the theory of natural selection, which never seemed to him adequate or sufficiently comprehensive to explain the origin of variations and the rise of new types; and it was he who originated the term *Neo-Lamarckism*. "Neo-Lamarckism," he explained, "gathers up and makes use of the factors both of the Saint-Hilaire and Lamarckian schools, as containing the more fundamental causes of variation, and adds those of geographical isolation or segregation (Wagner and Gulick), the effects of gravity, the effects of currents of air and of water, of fixed or sedentary as opposed to active modes of life, the results of strains and impacts (Ryder, Cope, and Osborn), the principle of change of function as inducing the formation of new structures (Dohrn), the effects of parasitism, commensalism, and of symbiosis—in short, the biological environment; together with geological extinction, natural and sexual selection, and hybridity."

Among American zoölogists who have advocated Lamarckian views are W. H. Dall, J. A. Allen, R. T. Jackson, C. H. Eigenmann, and others; in England, Spencer, Henslow, Cunningham, Gadow, and others; in France, Giard, Perrier; and in Germany and Holland, Haeckel, Wagner, Eimer, Standfuss, Fischer, Plate, Pfeffer, O. Hertwig, Emery, Roux, and others. Consult A. S. Lamarck, *Zoölogical Philosophy*, translated and with an introduction by Hugh Eaton (New York, 1914).

NE'OLITH'IC MAN (from Gk. *νέος, neos*, new + *λίθος, lithos*, stone). The term applied by European archæologists to the races in the period when the polishing of stone, agriculture, pottery, weaving, domestication of animals, and the construction of pile dwellings on lakesides in Switzerland, France, Italy, and Ireland, the burying of the dead in dolmens, and the rearing of megalithic monuments, were practiced. See NEOLITHIC PERIOD.

NEOLITHIC PERIOD. The first step towards placing prehistoric archæology on a scientific basis was taken in Scandinavia. Thomsen, of Copenhagen, was the first archæologist to employ the methods of geology and paleontology. Seconded by Forchhammer, Worsaäe, Steenstrup, and Nilsson, he succeeded in establishing a relative chronology for prehistoric times. His system, based on the development of human industry, was published in 1836 and has served as a foundation for all later classification. Thomsen divided prehistoric times into the ages of Stone, Bronze, and Iron. His system, applied to the collections of the Copenhagen Museum, was immediately accepted throughout Scandinavia and later by the entire civilized world. In time the three ages were subdivided into periods and epochs. The discoveries in valley deposits and caves of industrial remains older than any known in Denmark led to a subdivision of the Stone age. That portion of the Stone age corresponding roughly in time to the geologic past or Pleistocene was called the *paleolithic* period (q.v.), and that portion dating from the geologic present was called the *neolithic* period. These terms were first employed by Sir John Lubbock. They are preferable to the terms "age of chipped stone" and "age of polished stone." Many of the stone implements belonging to the neolithic period were never polished. On the other hand, although the polishing of stone was never resorted to as a shaping process during the paleolithic period, stones polished by use, such as grinding and polishing stones, do occur.

The dividing line between neolithic and paleolithic was quite naturally placed where the break seemed greatest. In any succession of cultures certain elements are carried to the succeeding phase, while certain elements are lost. The life of some industrial types is short, while that of others is long. The apparent failure of the neolithic to inherit largely from the paleolithic led for a while to the quite general belief in a hiatus between the two periods of the Stone age, a belief that at first seemed to be supported not only by a cultural gap, but by geologic and faunal changes as well. The ice sheet of the last (Würm) glacial epoch was followed in its retreat to the north by cold-loving animals, such as the mammoth, the woolly rhinoceros, and the reindeer. Cave art, inseparably linked with these forms, likewise disappeared. The stag superseded the reindeer. These changes, however, took place before the close, rather than at the close, of the paleolithic period. The Azilian epoch is, properly speaking, the closing phase of the paleolithic, yet it has tended almost to bridge the gap between the latter and the neolithic period, so that the hiatus is evidently more apparent than real.

An important discovery bearing on the transition was recently made by G. F. L. Sarauw on the island of Zeeland, Denmark. The station is in the Maglemose (great peat bog). This was apparently a lake station, and, since there are no remains of piles, the dwellings are supposed to have been on rafts. The cul-

tural remains are suggestive of the Azilian. There are no pottery and no polished flint implements; likewise no domestic animals with the exception of the dog. According to Sarauw (and Brögger agrees with him), the Maglemose culture belongs to about the middle of the *Ancylus** period, when the land, somewhat higher than at present, was covered by pine forests (*Pinus sylvestris*) and the Baltic was a fresh-water lake. The Maglemose, then, is the oldest known culture in Denmark. It is also found in regions of northern Germany and southern Sweden.

A change of land level and climate brought on a new epoch, that of the shell heaps. The southern Baltic area sank, converting the great Baltic lake into a sea once more. The oak tree supplanted the pine. As the temperature rose and the sea became more salt, the oyster and *Littorina littoria* took the place of *Ancylus*. The presence of *Tapes decussatus* in the waters of western Sweden, Denmark, and southern Norway indicates that the climate of that region during the *Littorina* or shell-heap epoch was even milder than at present.

The shells of oyster, *Cardinum edule, Mytilus edulis, Littorina,* and *Tapes* make up the great mass of the shell-heap deposits, which often attain large dimensions. Shellfish thus formed the chief nourishment of the people of that time; for, if not the dwelling sites, the shell heaps were at least the great outdoor restaurants of the masses. Mingled with the shells are fish bones and the broken bones of water birds. Less plentiful are the bones of mammals. The elk, common in the Maglemose epoch, has almost disappeared. The dog is the only domesticated animal. Associated with shells and bones are hearthstones, rude chipped-flint implements, bone and horn tools, and potsherds. Among the flint implements the two most characteristic are the pick and the paring knife. (See KITCHEN MIDDEN.) Before the close of the shell-heap epoch the land began to rise and the movement continued till the early Middle Ages.

Outside of southern Scandinavia shell heaps are comparatively rare in Europe; but a culture supposed to be synchronous is found in western Europe, particularly in northern France. It has received the name Campignian, from the station of Campigny in the commune of Blangy-sur-Bresle (Seine-Inférieure). At Campigny are numerous cabin sites, one of which was carefully excavated by Salmon, D'Ault du Mesnil, and Capitan. It proved to be a pit sunk in the gravel bed. At the bottom of the pit was a black mass of charcoal and ashes, with numerous flint implements; also the bones of *Bos,* the stag, and the horse. An analysis of the charcoal proved the presence of the oak. Above the black hearth deposit was a filling of yellow sandy clay, with nodules of clay and industrial remains similar to those of the layer beneath. These two deposits are of Campignian age. While the scrapers, perforators, and gravers are suggestive of the upper paleolithic, the two new and dominant forms are the pick and paring knife, so characteristic of the shell-heap industry. The presence of potsherds and the absence of polished flint implements are notable features of the Campignian culture. In the vegetal earth that formed a surface covering over the pit were found polished and other flint implements. Practically the same stage of culture is to be found at the great camp of Catenoy, near Clermont (Oise). While the superficial layer contained polished flint implements and remains of the Bronze age and Roman times, the industry found at a depth of 30 centimeters and more was confined to forms that first appeared in the paleolithic, and the pick and paring knife (the two new types), as well as pottery. The same phenomenon is repeated at many village sites of western Europe, Italy, and even as far east as Russia. If, then, the Azilian and Maglemose cultures represent the last term in the paleolithic series, the Campignian and the epoch of the shell heaps represent the initial term of the neolithic series.

Chronologic Subdivisions. Archæologists of the North took the lead in establishing a definite chronology for prehistoric times; since Thomsen's time they have kept pace with the general progress made, especially in the domain of the neolithic and subsequent periods. Stratigraphy is the potent guide to a chronology of the paleolithic period. In the neolithic, on the contrary, stratigraphy is for the most part lacking. Recourse is thus had to the typologic method, with results that do not always carry universal conviction. There is thus as yet no unified neolithic school of thought and practice. In Denmark Worsaæ early recognized two neolithic epochs. His successor, Sophus Müller, has gone further by subdividing the second of Worsaæ's epochs. Müller's system comprises (1) epoch of the shell heaps, (2) epoch of the pointed-poled and the flat-poled axe, and (3) epoch of the dolmens. (See MEGALITHIC MONUMENTS.) The latter epoch is subdivided into three successive stages: that of the (*a*) simple dolmens, (*b*) many-chambered (giant) dolmens, and (*c*) stone cists and individual graves. The pointed-poled and the flat-poled axes of the intermediate epoch are apparently derived from the Campignian pick and paring knife of the shell-heap period. Beginning with the second epoch, one begins to find polished flint implements.

During the closing stage of the third epoch, burials were in cists, the walls and coverings of which are comparatively thin flat stones split for the purpose. They were small and covered by insignificant mounds that were never marked by stone inclosures. A cist contains from 1 to 11 skeletons. Closely related to the stone cists and belonging to the very close of the Stone age are the individual graves. These are even less conspicuous than the cists, and, as their name suggests, never contain more than one skeleton, which rests on a floor of loam or stone, is surrounded by a number of stones, and is simply covered with earth. Such burials are in or under low flat mounds.

The characteristic implement of the third period is the thick-poled axe, which is especially abundant in the small and giant dolmens. A large dolmen will contain 20 or 30 axes and chisels and as many arrowheads. Pottery and objects of bone and horn also abound. The perforated battle axe, pecked and ground into shape, is the usual accompaniment of the stone cists and individual graves. Spearheads and poniards are abundant. They are always of flint and belong to a limited number of well-defined types. The hilt or shaft end varies so that one cannot always distinguish between the spear and the poniard. Those with beautifully chipped handles were without doubt poniards. These

* *Ancylus fluviatilis,* a small mollusk that lived in the Baltic fresh-water lake.

are so numerous that it must have been the custom to carry one always in the belt.

It is worth while to trace the evolution of the poniard during the third epoch. In the oldest type there is practically no differentiation between blade and hilt; both are very thin. The margins curve with perfect regularity from the point to the end of the handle. The chipping is done with admirable regularity, often appearing as oblique parallel grooves. In the second stage of development the hilt becomes more and more differentiated from the blade, and is thicker. These two types are found in the dolmens. In the stone cists one finds the third type. The hilt has become quadrangular in section; its breadth is about the same at all points, and the corners are carefully chipped. With the fourth type, also found in the cist graves, the hilt becomes heavier and widens at the pommel, presenting a rhomboidal cross section.

The foregoing classification is practically the same as that worked out by Montelius of Stockholm and, broadly speaking, applies also to northern Germany. In Switzerland the problem is different, and yet even there both Heierli and Gross make a triple division of the neolithic period, the last witnessing the introduction of objects made of copper and hence marking the transition to the age of metals. The three divisions are based principally on the finds made at three lake dwellings. These in the order of age are: Schafis, near Neuville; Moosseedorf, at Münchenbuchsee; and Vinelz, in the Lake of Bienne.

The stone axes of the oldest epoch are small, rude, and made of local material. The pottery is crude and undecorated. Woven fabrics are found. Wild animals were used for food in greater quantities than domestic animals. With the second epoch the lithic culture is influenced by the importation of nephrites. Stone implements are finely polished and often perforated. There is an improvement in the potter's art, many of the vessels being ornamented in a simple but effective manner. Wild and domestic animals were about equally employed for food. The population was in a large measure brachycephalic. The characteristic features of the third epoch are the string ornament in pottery, the increasing presence of domestic animals, and the appearance of copper.

It will thus be seen that, if much still remains to be done in the way of relative chronology, one is safe in assuming that there were three more or less distinct phases of the neolithic period—an initial stage, marked by the complete absence of polished flint implements and the appearance of pottery represented by the kitchen middens and the so-called Campignian culture; a middle stage, marked by the introduction of polished flint tools and weapons; and a closing phase, characterized by the occasional appearance of copper objects.

It would be difficult to apply anything like an exact time scale to the neolithic period. If there was no hiatus, then the neolithic begins where the paleolithic left off, say from 10,000 to 20,000 years ago. A very moderate estimate would place the beginning of the kitchen-midden or Campignian epoch at 8000 B.C. and the middle epoch at 6000 to 2500 B.C. It should be recalled that the neolithic period persisted longer in the north than in the south of Europe and Egypt. The figures mentioned are intended to be valid only for central Europe.

Inhumation was the dominant mode of disposing of the dead, but incineration was also practiced to some extent in certain parts of Germany, France, and Switzerland. Neolithic sepultures belong to five classes: (1) simple burial in the earth without protective envelope of an enduring nature, (2) burial in natural caverns or shelters, (3) in dolmens, (4) in artificial caves, and (5) in stone cists.

Neolithic Contributions to Civilization. European neolithic culture is the resultant of a gradual regional evolution regulated in a measure by forces from without. An analysis of all the elements is impossible in the present state of our knowledge. This much we know, that there was a swing of the culture pendulum towards more serviceable, if less artistic, lines of activity. Magic finally failed to give to an increasing hunter (paleolithic) population a regular and adequate food supply. Neolithic man solved the problem by the domestication of both animals and plants, thus registering one of man's greatest conquests over nature. The dog was the first animal to be domesticated; after that came the horse, ox, sheep, goat, and pig. Among cereals, wheat was the most common; barley, oats, and rye were also cultivated. Flax was the principal textile plant. It is probable that the grape was also cultivated. Other fruits as well as nuts appreciably augmented the neolithic food supply. Thanks to the habit of living in pile dwellings, such delicate products as woven fabrics, cereals, and fruits have been preserved to our day.

Of prime importance was the potter's art, which appeared at the beginning of the neolithic and which ever since has contributed so much to human comfort and well-being, aside from its purely artistic possibilities. The potter's wheel was unknown and the firing was done in the open. Neolithic pottery is divisible into three great groups based on form and decoration. To the first group the Germans have given the name Schnurkeramik, because the ornamentation consists of string imprints. The geographic distribution of the Schnurkeramik embraces central and eastern Europe. The second or caliciform group was at one time combined with the first; but it differs not only in form and ornament but also in respect to geographic distribution. The decoration on caliciform vases consists of horizontal zones that cover the whole surface of the vessel instead of being confined to the upper third. This group is found widespread in southwestern Europe (Italy, Sardinia, Sicily, France, Spain, and Portugal), also the British Isles, Holland, Denmark, parts of Germany, and Austria. The third group, or Bandkeramik, is decorated by bands consisting of continuous incised or punctate lines disposed in chevrons, undulations, spirals, and otherwise. It is spread over even a vaster territory than the two preceding groups, since it occurs throughout practically the whole of Europe with the possible exception of the British Isles.

Neolithic constructive ability is seen not only in the megalithic monuments and pile dwellings but also in the numerous fortified camps. A good example is the Camp de Chassey (Saône-et-Loire), on the summit of a narrow rock promontory, whose escarpments not only protect but command in all directions. At each extremity are formidable earthworks, that even yet reach a maximum outside height of 14 meters.

Concerted activity and commerce on a considerable scale are indicated by great workshops suitably located for the fabrication of flint implements. One of the greatest workshops is that at Grand Pressigny (Indre-et-Loire), which extends over a zone 12 kilometers in length. The wide distribution of the Grand Pressigny product through commerce is easily traceable on account of the peculiar beeswax color of the flint. M. de Saint-Venant in a special study has traced the dissemination of these flints over a large area, including Brittany, northern France, western Switzerland, and even into Belgium, where local flint of another variety is by no means rare.

Only in the neolithic period did man first begin to realize that the earth and the fullness thereof was his. He regulated the food supply by domesticating animals and plants. The ceramic and textile arts were made to minister to his comfort. In the matter of tools and weapons his choice of materials was still limited to stone, wood, bone, and horn. Flint was his chief reliance, and this he had learned not only to chip with much dexterity but also to polish. He also observed that dry, weathered-surface flints were more difficult to manipulate than those *in situ*. As a result the mining for flint became an important industry. The mining was done not only by open cast but also by shafts and galleries. At the well-known neolithic flint mines of Spiennes, near Mons, Belgium, discovered in 1866, two methods of mining were employed: galleries were driven in from the valley slope and shafts were sunk from the surface of the plateau above. Here the mining operations occur over an area of 60 acres, some of the shafts being sunk through flint veins of poor quality to a depth of 10 meters before reaching the kind of flint desired. At the bottoms of the shafts are chambers of considerable size from which galleries radiate in various directions. After extracting the flint the galleries were filled with rubble as a precautionary measure. At Obourg, Belgium, the open-cast system was employed. This is thought to antedate mining by shafts and galleries. Some of the trenches at Obourg reached a depth of 4 meters. Here the skeleton of a miner with his tools was recently unearthed. He had evidently been accidentally buried while engaged in driving a crosscut between two trenches.

The mining tools were picks of staghorn and flint. The scapula of *Bos longifrons* was also employed, probably as a shovel. Much workshop débris is found about the shafts of flint mines. The great flint mines of Grimes' Graves and Cissbury in England are well known. Flint-mining operations are traceable all the way from Norfolk to Sicily. With the introduction of metals, the mining of flint for implements gradually fell into disuse. It persists, however, even to-day at Brandon (Suffolk), where the product is converted into gun flints. Since the introduction of the automobile the exploitation of flints for road metal is no longer so popular as it once was. Thus it is that new inventions and the discovery of utilizable elements hitherto unknown have ever been powerful factors in the conservation of natural resources.

Neolithic Races. The principal European races of the present time are: (1) the Northern blond dolichocephalic race; (2) Mediterranean, dark-haired, dark-eyed, dolichocephalic; and (3) Alpine brachycephalic race. Skulls representing these three types are found in neolithic graves and in approximately the same geographic distribution. Of the dolichocephalic races one has a high forehead and long face, the other a low forehead and a broad face.

Remains of a pygmy race dating from the beginning of the neolithic and even earlier have been encountered in central Europe, especially in Switzerland, parts of Germany, and France. The pygmy skeletons are always associated with those of normal size in the same graves and cemeteries.

The elements that go to make up the neolithic population of Europe are not foreign to those seen in the last paleolithic races. To a certain extent, therefore, somatology is not inconsistent with archæology. Both seem to point to a gradual diffusion of new blood and new ideas rather than to changes due to invading and conquering hosts. Combined cultural, physical, and linguistic studies may yet succeed in throwing new and much-needed light on the nature and number of the elements that entered into the make-up of the European neolithic population. See BRONZE AGE; EUROPE, PEOPLES OF; MAN, SCIENCE OF, *Ancient Types*.

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NE'ON (Gk. *néon*, neut. sing. of *néos, neos*, new). A gaseous element obtained from the atmosphere by Ramsay and Travers in 1898. It resembles helium and the other members of its group in being chemically inert, no compound of helium with any other element being known. Neon is separated from the air in the same way as krypton. Neon (symbol, Ne; atomic weight, 20.2) is a colorless and odorless gas which can only be liquefied below —210° C. Its molecules, like those of argon, helium, and the other rare gases of the atmosphere, are made up of single atoms. One million volumes of air have been shown to contain about 15 volumes of neon.

NE'OPHYTE (Fr. *néophyte*, from Lat. *neophytus*, from Gk. *neóphytos*, from *néos, neos*, new + *phytós, phytos*, grown, from *phýein, phyein*, to grow). The name given in early ecclesiastical language to persons recently converted to Christianity. The word is used in this sense in 1 Tim. iii. 6, and is explained by St. Gregory the Great as an allusion to "their being newly planted in the faith." It differed from catechumen (see CATECHUMENS), in supposing the person to have not only embraced the doctrines of the Church, but also to have received baptism. The passage referred to directs Timothy not to promote a neophyte to the episcopate; and this prohibition was generally maintained, although occasionally disregarded in extraordinary circumstances, such as those of St. Ambrose (q.v.). In the modern Roman Catholic church the same discipline is observed, and extends to persons converted not alone from heathenism, but from

any sect of Christians separated from the communion of Rome. The time, however, is left to be determined by circumstances.

NEO-PLA'TONISM. The name applied to the teachings, primarily of the Græco-Alexandrian school of philosophy, and later of a number of Italian humanists, as well as some Englishmen. The extension of the Roman Empire and the growing intercourse between different parts of the world gave rise to an eclectic tendency which combined features of various systems. The process of amalgamation showed itself most prominently at Alexandria, whose central position made it a meeting place for the chief religions and philosophies of the ancient world. Such a philosophy, therefore, as that promulgated by the Neo-Platonists, combining the peculiar mental characteristics of the East and the West, naturally originated there, though it soon ceased to have any local connection. The term Neo-Platonism is sometimes loosely used to signify the whole new intellectual movement proceeding from Alexandria, and attempts have been made to include among its exponents some of the Christian Fathers, such as Clement of Alexandria and Origen; but the name is more properly applied to the school of Ammonius Saccas (q.v.) and his followers. Plotinus (q.v.), a pupil of Ammonius, was its most important champion. Porphyrius, Iamblichus, and Proclus (qq.v.) represent a continuous decline in philosophic interest and a greater and greater tendency to wild and fantastic religious syncretism. In common with Neo-Pythagoreanism and the Judæo-Alexandrian philosophy represented by Philo, the teaching of this school is characterized by an opposition of the divine and the earthly, an abstract conception of God which excludes all knowledge of the divine essence, a contempt for the world of sense which rests on the Platonic doctrines of matter and of the descent of souls into bodies, the supposition of mediating forms which carry over the divine operations into the world of phenomena, the demand for an ascetic liberation from a life of sense, and a faith in a higher revelation obtained in ecstasy. The basis of the divine nature for this philosophy is unity, the one; from this as the primordial source of all things emanates pure intelligence; and from this, in turn, emanates the soul of the world, whose creative activity produces other lesser souls, of men and animals. The doctrine of the divine immanence in this *anima mundi* was one of the most marked points in later Neo-Platonism, and led very close to pantheism. One of the last Neo-Platonists of antiquity was Boëthius (q.v.), who by his continued popularity became the most influential medium for the transmission, during the early Middle Ages, of Greek philosophy to western Europe.

The fifteenth century witnessed a strong revival of interest in these speculations. Nikolas of Cusa (see CUSA) and other mystics sought to overcome the doubt arising from the inadequacy of human conceptions by the theory of man's immediate knowledge or intuition of God—a theory distinctly akin to the Neo-Platonic doctrine that the soul in a state of ecstasy has the power to transcend all finite limitations. The Italian humanists, in their reaction against the previously dominant Aristotelianism, paid great devotion to anything that seemed to derive from Plato. Marsilio Ficino, especially, by his translations of Plotinus, Porphyrius, and Iamblichus, contributed to the spread of these doctrines. The Cambridge Platonists (q.v.) were not without their affinities to the Alexandrian teaching; and Wordsworth's prevalent idea of the existence of a soul in nature which holds converse with the soul of man might be traced to the same source.

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NE'OPTOL'EMUS (Lat., from Gk. *Νεοπτόλεμος, Neoptolemos*). The son of Achilles and Deidamia, also called Pyrrhus. After the death of his father he was taken by Odysseus to Troy, where he was distinguished by his courage, and was one of the band who entered Troy inclosed in the wooden horse. He was the slayer of the aged Priam. (Consult Vergil, *Æneid*, ii, 469–558.) He returned with rich spoils to Phthia and married Hermione, the daughter of Menelaus. According to later legend he brought back with him as part of his booty Andromache, the wife of Hector, and settled in Epirus (*Æneid*, iii, 293 ff.), to become there the ancestor of the Molossian kings. Later he married Hermione when he had gone to Phthia to restore Peleus to his throne. He was killed at the altar at Delphi by Orestes, the former lover of Hermione, or by the Delphians. He was buried within the precincts of the temple, where he was afterward worshiped as a hero.

NE'O-PYTHAG'ORE'ANISM. The name of one of the two Græco-Alexandrian schools of philosophy, the other school being the Neo-Platonic. (See NEO-PLATONISM.) Pythagoreanism was revived in the first century B.C. by P. Nigidius Figulus, a Roman prætor, but Apollonius of Tyana (q.v.) was the most prominent representative of this attempt to blend Pythagorean philosophy with Oriental theosophy. The Neo-Pythagoreans regarded it as the greatest task of the philosopher to purify himself from connection with matter by the suppression of desire and by the observance of certain ceremonial rules which were adopted from the earlier Pythagorean brotherhood. In their theoretical system, numbers had symbolic significance. Consult: Zeller, *Die Philosophie der Griechen*, part iii; *Die nacharistotelische Philosophie* (3d ed., Leipzig, 1880–81); Vacherot, *Histoire critique de l'école d'Alexandrie* (Paris, 1846–51); also the histories of philosophy by Ueberweg-Heinze, Windelband, Erdmann, and Bergmann.

NEO-REALISM. See REALISM.

NEORNITHES, nê-ôr'nĭ-thēz (Neo-Lat. nom. pl., from Gk. *néos, neos*, new + *ὄρνις, ornis*, bird). Modern birds, as distinguished from those of Jurassic times, which are called *Archornithes*. They are characterized by fused metacarpals, the second finger longest, and the caudal vertebræ not more than 13 in number. The group

comprises not only existing groups, but all fossil birds except *Archæopteryx*.

NEOSALVARSAN. See SALVARSAN.

NEOSHO, nē-ō′shō. A city and the county seat of Newton Co., Mo., 19 miles southeast of Joplin, on the Kansas City Southern, the Missouri and Northern Arkansas, and the St. Louis and San Francisco railroads (Map: Missouri, B 5). It has a public-school library. The United States government fish hatchery here includes 34 ponds, well stocked with various species of fish. The city is on the edge of the zinc and lead mining district of southwestern Missouri, has a canning factory and planing mill, and manufactures foundry and machine-shop products, agricultural and mining implements, flour, etc. Settled in 1839, Neosho was incorporated as a town in 1868, and in 1878 was chartered as a city. The water works are owned by the municipality. Pop., 1900, 2725; 1910, 3661.

NEOSHO. A river rising in Morris County, east-central Kansas (Map: Kansas, G 6). It flows east and then southeast, draining eastern and southeastern Kansas, and then southward, emptying into the Arkansas River, just below Fort Gibson, Okla. It is about 400 miles long, and its drainage basin has an area of about 12,600 square miles. The chief towns on its banks are Oswego, Burlington, and Emporia. Its principal tributary is the Spring River.

NEOTROP′ICAL REGION. In zoögeography, a primary division embracing South America and its islands, Central America, and the hot lowlands of Mexico and the West Indies. Other names proposed for it have been Austro-Columbian, Dendrogæa, and Notogæa. Its characteristics are more distinctly marked than those of some of the other regions, and indicate a remote antiquity for the mainland areas and a long period of isolation from North America. It also has some curious resemblances to the Australian region, especially in the presence of marsupials and ratite birds. It is naturally divided into four subregions by physiographic features. The first, or Brazilian, subregion comprises the great forested equatorial area from the Caribbean coast to the pampas of southern Brazil. The second, or Chilean, subregion stretches along the Andean plateaus and the dry coast strip between the Andes and the Pacific, from Peru to about lat. 4° N. The third, or Mexican, subregion (q.v.) consists of Central America and tropical Mexico. The fourth, or Antillean, subregion embraces all the West Indies except Trinidad and Tobago, which are continental in their characteristics. The region as a whole is characterized by great richness of life, as well as by marks of isolation. Wallace found that it had eight families of mammals absolutely confined to it, including the distinct group (Cebidæ and Hapalidæ) of New World monkeys, the bloodsucking bats (Phyllostomidæ); the chinchillas, cavies, and three other families of rodents. Nearly all the edentates of the world are collected here—sloths, armadillos, anteaters, and the like. It has also many important lesser groups, as the llamas, the opossums (save two species), the hutias, the solenodons, and many peculiar carnivores. The absence of certain groups is notable; it has no civets, no insectivores (save a shrew or two from the North), no wild cattle or sheep, no ruminants except the llamas and a few deer, and no other hoofed mammals except the tapir (elsewhere known only in Malaya) and the peccary. In birds the case is even more extraordinary. About 25 of its families are not known elsewhere, including such large or peculiar groups as the plant cutters, manakins, cotinga, ant thrushes, tree creepers (Dendrocolaptidæ), toucans, todies, motmots, curassows, tinamous, sun bitterns, and many others; while it possesses the great majority of several groups, such as the humming birds, only scantily present in North America, and not known at all in the Old World. A similar account might be given of regional peculiarities in the departments of reptiles, amphibians, fishes, and the many branches of invertebrate life. The West Indies, as a part of this region, present some extraordinary peculiarities. Though so near to the shores of North America, their zoölogical affinities are distinctly Neotropical, and they present curious resemblances to the island fauna of Madagascar. See AMERICA, *Fauna;* Zoögeographical Map under DISTRIBUTION OF ANIMALS; and consult the authorities there cited.

NE′OZO′IC (from Gk. *néos, neos,* new + *zōḗ, zōē,* life). A term introduced by Edward Forbes to include all the strata from the Trias to the most recent deposits. It has been occasionally used as a substitute for Cenozoic (see CENOZOIC ERA) and for the Tertiary system (q.v.).

NEPAL, nē-pȧl′, or **NIPAL.** An independent state on the south slope of the Himalaya, bordering on British India (Map: India, E 3). It is bounded by Tibet on the north, by the native State of Sikim and Bengal on the east, and by Behar and the United Provinces of Agra and Oudh on the south and west. Its area is estimated at 54,000 square miles.

The southern portion, known as the terai, is a level strip of land, partly covered with forests and well cultivated. The rest of the country belongs to the region of the Himalaya (q.v.) and contains some of the highest mountains in the world, such as Mount Everest (29,002 feet), Kinchinjunga (28,156 feet), and Dhaulagiri (26,826 feet), which are covered with perpetual snow. There are a number of minor ranges intersecting each other and inclosing numerous valleys. The country belongs to the basin of the Ganges, its chief rivers being the Karnali and the Sarda in the west, the Gandak in the centre, and the Kosi in the east. The rain which occurs under the onblowing monsoons, June to October, is not heavy. The temperature varies considerably in accordance with the configuration of the surface. In the mountainous part it is naturally cold, while in the flat region along the south boundary and in some of the valleys of the interior it is hot and humid between April and June. The average temperature at Katmandu (over 4300 feet) is about 62° F. Deposits of iron, lignite, copper, lead, and zinc are found and exploited to some extent by the natives. There are also many mineral springs and some deposits of gold and silver. The chief occupation of the inhabitants is agriculture and grazing; the former, carried on in a primitive way, is highly intensive, owing to the scarcity of agricultural land. The slopes of the hills and ledges even, difficult of access, are utilized for agricultural purposes, and the methods employed for diverting mountain torrents for irrigational needs exhibit noticeable and varying degrees of ingenuity. See NAIPALI LANGUAGE.

The chief crops in the central valleys are several varieties of rice, wheat, pulse, corn, sugar

cane, potatoes, and various vegetables. In the terai region are cultivated tea, cotton, tobacco, etc. Many European fruits are successfully cultivated. Famine is unknown, and the people in general are prosperous. The chief manufactures are coarse cotton cloth, paper, brass bells, utensils, and ornaments. Excellent pottery is produced in some parts of the country, and the wonderful wood carving found in the temples testifies to the skill of the natives. Wood carving, however, as well as artistic working in brass, has declined. The commerce of Nepal is chiefly with British India and Tibet. From British India are imported cotton piece goods, cotton yarn, woolen goods, silver, spices, salt, brass, copper, sugar, iron, leather goods, etc. These are partly reëxported to Tibet, which sends in return drugs, shawl wool, coarse woolen cloth, salt, paper plant, domestic animals, honey, wax, quicksilver, gold, etc. The chief exports to British India are rice, oil seeds, cattle, tobacco, hides, timber, spices, and ghee. The exports to and imports from British India amounted in 1912–13 to Rs. 45,498,493 and Rs. 22,243,544 respectively. Goods are usually transported by human carriers or pack animals.

Nepal is a monarchy. The actual ruler is the Prime Minister, who is nominally assisted by a council of his own choosing. There are civil and criminal courts. The savage native code has been humanized by British influence. Foreign relations are controlled by the government of India, which is represented at Katmandu, the capital, by a Resident. The revenue of the government is derived chiefly from land tax, customs, mines, forests, and monopolies. There is an efficient army of about 45,000, including 2500 artillery, which can be greatly enlarged in case of necessity in view of the fact that the Gurkhas (q.v.) are able fighters.

No reliable figures as to the population of Nepal are available. Native statistics place it at 5,000,000, but these figures are probably exaggerated by at least a million. The great mass of the population of Nepal are by some considered to be Mongolic with large infusions of Dravidian and Aryan blood, while others regard them as a mixed race of Indo-Afghan and Mongolic descent. The Gurkhas (q.v.), the ruling class, are the typical representatives of the Nepalese; they include the military tribes of the Khas, Gurungs, Magars, and Thakurs and are descended from aboriginals who intermarried with Rajput and other Hindu refugees from the Mohammedan invasion of the twelfth century. The Gurkhas are spread throughout the country. The Newars, who inhabit the valley of Nepal, constitute the largest division of the population. The Bhotias, who dwell in the east, include several tribes of Tibetan stock—the Kirantis, the Murmis, and the Limbus. Other tribes are the Lepchas, the Tharus, and the Bokras. The languages spoken in Nepal belong to the Tibeto-Himalayan branch of the Tibeto-Burman family of the Indo-Chinese languages. The lingua franca is Parbatya, i.e., hill speech, which resembles Hindi and is written in the Nagari character. The religion of the ruling dynasty and of the majority of the Gurkhas, Tharus, and Boksas, and of a part of the Newars, is Hinduism; the other inhabitants profess Buddhism and are accorded complete religious liberty. The two religions are supposed to be about equal numerically. Education is entirely in the hands of the priests, and the bulk of the population are illiterate. The children of the wealthy classes are sent to the educational establishments of British India.

History. Various ruling dynasties from a remote period are given in the native literature, but the first authentic mention of a ruler—Ançuvarma of the Thakuri dynasty—is made by Hiuen Tsang, the Chinese Buddhist pilgrim, who visited Nepal in the seventh century. In 1324 the country was invaded and occupied by Harisinha-deva, Rajah of Simraungarh. Modern history begins in 1768 with its conquest by the Gurkhas, who originally were driven from Rajputana by the Mohammedan invasion. Gurkha aggressions on Tibetan territory in 1790 led to their defeat by China and the limitation of their northern boundary. In 1814, by way of reprisals, the British invaded the country, but were defeated; the following year, however, advancing on Katmandu, they obtained favorable conditions of peace and the establishment of a British Residency at the capital. By the assassination of his uncle in 1845 and by the Kot massacre of his opponents in the following year, Jung Bahadur, a colonel in the army, became Prime Minister and nominal ruler. Having firmly established himself in power, he visited England in 1850, and after his return the fruits of his journey were exhibited in the wise reforms that he introduced. During the Indian Mutiny of 1857 he rendered valuable assistance to the British and was handsomely rewarded. He died in 1877 and was succeeded by his brother, who also resorted to wholesale executions to maintain his ascendancy and ruled until 1885, when he was murdered at the instigation of Bir Shamsher Jang. The latter became Prime Minister and father-in-law, by two daughters, of the reigning Maharajah, Pirthivi Bir Bikram, who was born in 1875 and ascended the throne in 1881. The Maharajah died in 1911 and was succeeded by his son, Tribhubana Bir Bikram. In 1901 Sir Chandra Shamsher Jang succeeded Bir Shamsher Jang as Prime Minister.

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NEPALI LANGUAGE. See NAIPALI LANGUAGE.

NEPAUL. See NEPAL.

NEPEN'SIS COLO'NIA. See NEPI.

NEPENTHE, nĕ-pĕn'thē, or **NEPENTHES,** nĕ-pĕn'thēz (Gk. *νηπενθής, nēpenthēs*, from *νη-, nē-*, negative prefix + *πένθος, penthos*, grief). In the *Odyssey*, iv, 221, an epithet of a drug given

to Helen in Egypt, possessing the power to bring forgetfulness of every pain or grief. Later writers identified the drug with opium or some preparation of hemp.

NEPENTHES. A genus of herbs or half-shrubby plants of the family Nepenthaceæ. The species are natives of swampy ground in India, Indo-China, Malaysia, Madagascar, etc., and are chiefly remarkable for the leaves of some species, which consist of a dilated foliaceous petiole, prolonged beyond its foliaceous part, as if it were the prolongation of the midrib of a leaf, and terminating in a pitcher (ascidium), from which the name "pitcher plant" has been derived. The pitcher is terminated by a lid, which is regarded as the true blade of the leaf. The fluid found in these pitchers is a secretion of the plant itself. Insects often enter the pitcher and, according to investigations of Vines, are dissolved by a ferment secreted by the leaves and absorbed, so that the nepenthes rank among insectivorous plants. Many of the species are epiphytes, being attached to trees and other plants, and are rather commonly grown in hothouses for their strange leaves. The name "pitcher plant" is applied to many other plants, as *Sarracenia* spp., *Arisæma triphyllum*, etc.

A CULTIVATED VARIETY OF NEPENTHES.

NEPH'ELITE (from Gk. *νεφέλη, nephelē*, cloud). A mineral sodium-aluminium silicate that crystallizes in the hexagonal system, has a vitreous or greasy lustre, and is generally colorless or light yellow, though sometimes when found massive it is green or red. It occurs in both ancient and modern volcanic rocks and in crystalline rocks, such as syenite. It is found in the lavas of the volcanoes of Italy, also in Bohemia, France, Brazil, and Canada; in the United States the massive and crystallized varieties are found in Maine, New Jersey, the Ozark Mountains (Arkansas), and Montana.

NEPHELITE, or **NEPH'ELENE, SY'ENITE,** *Laurvigite.* An igneous rock of granitic texture, of which the essential mineral constituents are nephelene and alkali feldspar. Nephelene syenites usually contain also an alkaline variety of pyroxene (acmite or ægirine) and frequently also nosean or haüyne, sodalite, sphene, and peculiar varieties of mica (lepidomelane) and garnet (melanite). These minerals are so generally found together, and so rarely occur except when in association with nephelene or the allied mineral leucite, that the nephelene syenites and a few rare families of rocks (leucite syenites, theralites) are quite marked in their peculiarities. Nephelene syenites are very rich in the alkalies and alumina. They are quite subject to alteration by weathering processes. They occur in rather small bodies as a rule and are not so common as the ordinary class of syenites. (See SYENITE.) There are outcrops at Litchfield, Me.; Salem, Mass.; Beemerville, N. J.; Magnet Cove, Ark.; and in other places in the United States and in Canada.

NEPHE'LIUM. A genus of plants. See LITCHI.

NEPHI, nē'fī. A city and the county seat of Juab Co., Utah, 87 miles south of Salt Lake City, on the San Pedro, Los Angeles, and Salt Lake and the San Pete Valley railroads (Map: Utah, C 3). It is the distributing point for a district interested chiefly in farming, lumbering, and cattle raising and in the mining of salt and gypsum. The water works and electric-light plant are owned and operated by the city. Pop., 1900, 2208; 1910, 2759.

NEPH'OSCOPE (from Gk. *νέφος, nephos*, cloud + *σκοπεῖν, skopein*, to view). An instrument used by meteorologists for observing the clouds, and especially for determining the amount and direction of the horizontal component of the apparent motion of a cloud. The modern nephoscope is the development of an idea embodied by Aimé in 1846 in his so-called reflecting anemometer, and in its best form it has a wide range of usefulness. The simplest form is merely a horizontal mirror having a circular graduated edge. The observer brings one eye to such a position that the reflected image of the cloud is seen to pass from the centre of the mirror to the circumference, and he merely records the direction in which the image appears to pass off. The Marvin nephoscope, an instrument of high precision, is used by the United States Weather Bureau observers, and has been extensively employed in cloud observations. A form of nephoscope for use on vessels at sea was devised by Professor Finemann and used by him about 1888. About the same time Professor Abbe devised his marine nephoscope and a method of using it for determining absolute altitudes and movements of clouds at sea. It consists essentially of a light bronze circle fitting rather loosely on top of the ordinary ship's compass; it therefore replaces the nearly horizontal circle of the apparatus ordinarily used by the navigator to sight upon the sun when measuring azimuths. The bronze circle is graduated, and at its zero point carries a hinge and an adjustable arm having at its end a knob which serves to define the line of sight. The circle also carries a glass mirror from which the quicksilver backing has been removed, leaving a transparent circle, through which the graduation of the compass needle can be read. As this marine nephoscope enables one to locate a storm centre by the motions of the lower clouds better than can be done by the wind, and as it gives the direction of the pennant at masthead much more accurately than it can be observed by the unaided eye, it is strongly recommended for use by navigators at sea. To ordinary meteorological observers it has the special advantage of being the only instrument by means of which observers at sea can easily determine the absolute altitude and movements of clouds.

In 1897 Louis Besson of Paris devised the nephoscope now generally known by his name, also sometimes called a cloud rake from its general resemblance to that garden implement. Besson's device consists essentially of a horizontal rod provided with seven short upright points or teeth, three on each side of, and evenly spaced from, the middle tooth, which is in the axis of a vertical staff rigidly attached to the horizontal rod at its middle.

To observe cloud direction and velocity with this nephoscope (it is of course not a portable device), the observer takes position so that a selected cloud point falls immediately behind the central or axial tooth of the rake. Remaining in this position, he then turns the rake until

the line of teeth is in perspective agreement with the path of the moving cloud point observed. When thus adjusted, the direction of the assumed horizontal cloud path may be read off directly by the appropriate indicator on a graduated disk. The velocity of the cloud is determined by observing the time interval elapsing between the moment when it was on the middle tooth and the time at which it reached any other given tooth. Appropriate formulas, examples, and certain interesting problems which the use of this nephoscope developed will be found in the *Meteorologische Zeitschrift*, September, 1903, pp. 404 ff.

Bibliography. A full account of various forms of nephoscopes is given in Cleveland Abbe, *Treatise on Meteorological Apparatus and Methods* (Washington, 1888), published as part ii of the *Annual Report, Chief Signal Officer* for 1887. The Marvin nephoscope is described in the *Monthly Weather Review*, vol. xxiv (Washington, 1896), and also in separate pamphlets. The description of Abbe's marine nephoscope was first published in 1893 in the *Report of the International Meteorological Congress* held in Chicago (*Weather Bureau Bulletin No. 2*). A general description of work done with it is contained in the *American Meteorological Journal* for October, 1891.

NEPHREC'TOMY (from Gk. *νεφρός, nephros*, kidney + *ἐκτομή, ektomē*, excision, from *ἐκ, ek* + *τομή, tomē*, a cutting, from *τέμνειν, temnein*, to cut). The total removal of a kidney in rare cases of acute or chronic infection, either because the kidney is useless or because it is a source of infection owing to abscesses in its substance. Other conditions demanding removal are congenital malformation, hydronephrosis (destruction of the kidney from blocking of the ureter), and tumors. A kidney may be approached through an abdominal incision, but an oblique extraperitoneal lumbar incision is the route generally preferred. Cutting through the lumbar muscles obliquely, beginning an inch below the twelfth rib, making his incision downward and forward, the surgeon reaches the kidney. Blunt dissection frees it from its site and divests it of its capsule. Its pedicle is then tied, and it is separated and removed. Shock, severe hemorrhage, suppression of urine, peritonitis, or injury of neighboring structures may be unavoidable and add considerably to the risk of the operation. Consult Kelly and Burnham, *Diseases of the Kidneys, Ureters, and Bladder* (New York, 1914).

NEPH'RITE (from Gk. *νεφρός, nephros*, kidney). A variety of amphibole that varies from white to dark green in color, according to the amount of ferrous oxide that it contains. It is known chiefly through the carved ornaments and utensils that are found among the remains of primitive man in various parts of the world, especially in China and Mexico, and known under the collective name of *jade* (q.v.). Many imaginary virtues were ascribed to it, and it was especially sought after as a cure for epilepsy and diseases of the kidneys.

NEPHRI'TIS. See Bright's Disease; Cirrhosis.

NEPHROT'OMY (from Gk. *νεφρός, nephros*, kidney + *τομή, tomē*, a cutting). The operation of cutting open a kidney for the purpose of removing a stone (nephrolithotomy) or evacuating pus. An incision is made in the lumbar region, obliquely, from the outer border of the sacrolumbalis muscle, an inch below the twelfth rib, parallel to the rib and forward and downward. The organ being grasped and drawn into the wound, the surgeon bisects it through its convex edge, removes the calculi, or evacuates the pus. The viscus is sutured and replaced when uninfected, as after the removal of a stone; when an abscess is present, the cavity must be drained. Consult Warren-Gould, *International Text-Book of Surgery* (Philadelphia and London, 1902).

NEPH'THYS (Lat., from Gk. *Νέφθυς, Nephthus*, Egypt. *Nebt-hat*). An Egyptian goddess, the daughter of Seb and Nût, and the sister and wife of Set (q.v.). By her brother Osiris, or Set, she was the mother of Anubis (q.v.). Though in the earliest period she was regarded as a female counterpart of Set and always associated with him, still in the legend she joins with her sister Isis, in mourning over and guarding the body of Osiris, and therefore in funerary scenes the two goddesses are often depicted protecting the mummy of the deceased. The lamentations of Isis and Nephthys over the body of Osiris form the subject of a poem of which several copies have been preserved. Nephthys is usually represented as a woman wearing upon her head the ideogram of her name. As a protector of the dead from evil influences she was worshiped throughout Egypt. Consult: Horrack, *Lamentations d'Isis et de Nephthys* (Paris, 1866); Alfred Wiedemann, *Religion of the Ancient Egyptians* (Eng. trans., New York, 1897); E. A. T. Wallis Budge, *The Gods of the Egyptians*, vol. ii (London, 1904).

NEPI, nā'pē. An episcopal city in the Province of Rome, Italy, 17 miles southeast of Viterbo. It is the Etruscan Nepete and the Roman Colonia Nepensis. The town is encircled by its ancient walls and towers and has a Roman aqueduct, an eleventh-century cathedral, a ruined castle, built for Pope Alexander VI and used as the residence of Lucretia Borgia in 1500; also a handsome Renaissance municipal palace. Pop., 1901, 3036; 1911, 3063.

NEP'IGON, Lake. A lake of Canada. See Nipigon, Lake.

NEP'ISSING, Lake. A lake of Canada. See Nipissing, Lake.

NEPOMUK, nā'pō-mụk, John of. See John Nepomuk Salvator.

NE'POS, Cornelius. A Roman historian. The place and precise time of his birth are unknown. He was the friend of Cicero and Catullus. The only work of his which has survived is a series of 25 biographies, generally brief, of warriors and statesmen, mostly Greeks; this series is part of a work in 16 books, *De Viris Illustribus*. These biographies are distinguished by the simplicity and purity of their Latinity, the conciseness of their style, and their admirable delineation of character; but sufficient care has not been exercised in the examination of authorities, nor is the relative importance of things duly regarded. But in many matters they supplement, in important ways, other sources of information. Until the middle of the sixteenth century these biographies, on the strength of the titles given in the various manuscripts, were generally ascribed to Æmilius Probus, a writer who lived in the latter part of the fourth century; but in 1569 an edition was put out by the famous Dionysius Lambinus, who pronounced the so-called *Lives* of Æmilius Probus to be in reality the lost work of Cornelius

Nepos, *De Viris Illustribus*. This view is now generally accepted. The mistaken ascription to Probus arose from the presence in the manuscripts, after the "Vita Hannibalis," of a dedicatory epigram, by Probus, to Theodosius. There are many editions, among which may be mentioned those of Van Staveren (Leyden, 1773), of Tzschucke (Göttingen, 1804), of Fleckeisen (Leipzig, 1884), of Nipperdey (10th ed., ib., 1896), of Rolfe (Boston, 1894), of Lindsay (New York, 1895), of Flagg (ib., 1895), and of Winstedt (text, Oxford, 1904). Nepos wrote also *Chronica*, an epitome of the world's history; *Exempla*, a series of anecdotes, and letters. Consult Martin Schanz, *Geschichte der römischen Litteratur*, vol. i, part ii (3d ed., Munich, 1909).

NEPOS, Julius. A Roman emperor (474–475). He succeeded his uncle Marcellinus as Prince of Dalmatia. After the death of Olybrius, Nepos was selected by Leo I, Emperor of the East, his kinsman by marriage, to occupy the Western throne. As Emperor he ceded to the Visigoths the Province of Auvergne. In 475 Orestes, father of Augustulus, marched against Nepos at Ravenna. Nepos fled to Salona, where he was assassinated in 480 by two of his own officers. Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

NEP'TUNE (Lat. *Neptunus*), or Poseidon (Gk. Ποσειδῶν, *Poseidōn*, Doric Ποτειδάϝων, *Poteidavōn*, Ποτειδᾶν *Poteidan;* of uncertain etymology. Many connect the Greek name with Gk. πόντος, *pontos*, the open sea, and ποταμός, *potamos*, a river). In classical mythology, a brother of Zeus and lord of the sea. In legend he is the son of Cronus and Rhea. His home is a splendid palace in the depths of the sea near Ægæ, though which town of this name was meant caused much dispute. His wife in Hesiod is Amphitrite, and she shared his cult on the isthmus. As a lover he rivals his brother Zeus, and many legends traced local heroes to Poseidon and some nymph or daughter of an early king. So Neleus and Pelias were sons of Poseidon and Tyro. In his nature Poseidon is always wild and implacable, never becoming a guardian of higher virtues. He is the shaker of the earth, a natural conclusion from the frequency with which disturbances of the sea accompany the shocks on land; but he is, above all, the master of the sea, who sends the dreaded storms and at his will controls the waves, which are called his swift horses. His attribute is the trident, or three-pronged harpoon of the Ægean fisherman, with which he controls the waves or brings springs from rocks. Closely associated with him is the horse. He was the horse tamer and was honored with horse races at many points; horses were frequently sacrificed to him, and there are traces of a belief that he was in the form of a horse. His worship was chiefly confined to the coast, though he had temples even in the inland country of Arcadia, and it is not at all improbable that he was originally a god of water and moisture in general. There is some evidence for a decline in Poseidon worship, which seems reflected in the legends of his contest with Athena for Attica and with Hera for Argos. At Athens he was worshiped in the Erechtheum, and some have held that Erechtheus was in essence identical with Poseidon, or a form of Poseidon, and that this deity Poseidon-Erechtheus, overpowered by Athena, was converted into an agricultural deity. From him was also named the Attic month Poseideon (about December). He was a great Ionian divinity, and the Panionia were celebrated by the 12 Ionic cities at his sanctuary at Mycale. His temple on the island of Calauria, where Demosthenes died, was in very early times the centre of an amphictyony or league of maritime states. His most famous cult, however, was on the Isthmus of Corinth, where the Isthmian Games (see Isthmus) were celebrated in his honor. In art Poseidon has much the same type as Zeus, but without the dignity and benignity of the latter. Statues of him are by no means common. Two of the best are the Poseidon of Melos, now in Athens, and the fine statue in the Lateran, which many regard as derived from the famous bronze on the isthmus, by Lysippus.

At Rome the old Italian or Roman water god, who appears dimly in religious tradition, seems to have been early identified with Poseidon, and during the historical period Neptune is scarcely distinguishable from the Greek god of the sea. A temple to Neptune stood near the Circus Flaminius; his festival, the Neptunalia, was held on July 23. Consult: W. W. Fowler, *Roman Festivals* (London, 1899); O. Grupple, *Griechische Mythologie und Religionsgeschichte* (2 vols., Munich, 1906); L. R. Farnell, *The Cults of the Greek States*, vol. iv (Oxford, 1907); Georg Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912).

NEPTUNE. The outermost member of the solar system. Its mean distance from the sun is 2,792,000,000 miles; its diameter 34,800 miles; period of revolution about 165 years; mass 17 times that of the earth; density one-fifth of the earth's. Thus, it is about 85 times larger than the earth, but from its extreme remoteness is of almost inappreciable magnitude when seen through an ordinary telescope.

The discovery of Neptune was an event unique in scientific history. It was the disturbance in the motion of Uranus, caused by the attractive force of Neptune, which led to its discovery. From 1690 to its discovery as a planet by Herschel, Uranus (q.v.) had been repeatedly recorded as a fixed star. Earlier observations were found not to agree with later observations, and hence it became evident that either the earlier observations were erroneous or that Uranus was wandering from its ancient track. On Oct. 21, 1845, John Couch Adams (q.v.) communicated to the Royal Astronomer estimates of the elements and position in the heavens of a planet whose mass would account for the orbital irregularities of Uranus. This did not, however, lead to any search for the planet in the heavens, and the matter remained buried in obscurity. In the same year the attention of Urbain Jean Joseph Leverrier (q.v.), a teacher of astronomy in the Ecole Polytechnique, was brought to the Uranian difficulty. In two papers communicated to the French Academy, Leverrier proved that only an exterior body could produce the irregularities in the Uranian orbit. In a third paper, submitted Aug. 31, 1846, he had computed the orbit of the supposed planet, the visibility of which he described as that of a star of the eighth magnitude. These results were communicated to Galle of the Berlin Observatory, with a request to look for the planet in the place assigned to it. This Galle did in the evening of September 23 and perceived a small body with a disk nearly 3 inches in diameter. The place where it was found was within

less than 1° of the spot indicated. Before the news of the discovery reached England, it had already been duplicated. Under the direction of Airy, director of the Greenwich Observatory, Challis of the Cambridge Observatory had commenced a search for the planet July 29 and recorded 3150 stars, three of which were different positions of the planet, recorded on August 4, August 12, and September 29. Challis proceeded to map them, but as he had no good star map this required considerable time, and before this was accomplished news of the discovery arrived from Berlin on Oct. 1, 1846. Neptune had already been seen by Lalande on the eighth and again on the tenth of May, 1795, but was taken to be a fixed star and repeatedly entered in the catalogues as such till its discovery as a planet.

Neptune is attended by one satellite, which was discovered Oct. 10, 1846, by Lassell. This satellite, like the eighth and ninth satellites of Jupiter, Phœbe, the ninth satellite of Saturn, and those of Uranus, differs from the satellites of other planets in the direction of its motion, which is retrograde, i.e., from east to west, in a plane inclined at an angle of 35° to that of the ecliptic. Its period of revolution is 5 days, 21 hours, and its distance from the planet somewhat less than that of our moon from the earth. For an account of Neptune's discovery, consult A. M. Clerke, *History of Astronomy during the Nineteenth Century* (London, 1908). See Astronomy; Planets; Solar System.

NEPTUNE, Temple of. 1. A remarkably preserved and majestic Doric temple at Pæstum, originally called Posidonia, in Lucania. The temple is a peripteral hexastyle and measures 120 by 85 feet. Within the peristyle the cella has porches, each of two columns *in antis*, at front and rear. The temple stands on a platform of three steps and dates from the latter part of the sixth century B.C.

2. A temple forming part of a group of buildings erected on the Campus Martius at Rome, 26 B.C., by Agrippa in commemoration of the victories at Mysæ, Naulochus, and Actium. It stood in the midst of a great square surrounded by a colonnade, the Portico of the Argonauts, which was decorated with naval paintings. The whole group was called the Neptunium and was the seat of the Admiralty. It was destroyed in the great fire of 80 A.D. and was restored by Hadrian. Eleven columns of the temple, with a part of the cella and decorated ceiling, are still preserved. See Plate of Pæstum.

NEPTU'NIAN (from Lat. *Neptunius*, relating to Neptune, marine, from Lat. *Neptunus*, name of the Roman sea god). A term formerly applied to the geologists who maintained the aqueous as against the igneous theory of the origin of rocks. The discussions between the two schools were long and bitter. The most prominent advocate of the aqueous theory was the German geologist Werner, who taught at the famous Freiberg School of Mines in the latter part of the eighteenth and the early years of the nineteenth centuries. The theory has long since been superseded by the view that there are two types or classes of rocks—the one originating from igneous agencies and called the massive rocks, and the other resulting from aqueous deposition and known as the sedimentary class.

NEQUI'NUM. See Narni.

NÉRAC, nā'räk'. A town in the Department of Lot-et-Garonne, France, on the Baise, 15 miles southwest of Agen (Map: France, S., E 4). The old town, Petit Nérac, on the right bank of the river is united by bridges to Grand Nérac, the modern industrial quarter on the left bank. The ruins of the imposing royal castle of Henry IV, now numbered among French historical monuments, and the park and promenade of La Garenne along the river bank, are the chief objects of interest, and there is a small museum with remains of a Roman city which once occupied the site of Nérac. Corks, machines, coaches, cloth, brandy, and beer are manufactured, and there is a general trade in wine, grain, and hemp. Here Henry IV, to whom there is a monument, spent his youth. Pop. (commune), 1901, 6435; 1911, 6279.

NERBUDDA, nĕr-bŭd'ā, more correctly **NARBADA,** nŭr-bŭd'ā (Skt. *Narmada*). A river of India, ordinarily considered the boundary between Hindustan proper and the Deccan. It rises in the Maikal Range in the northern part of the Central Provinces and flows southwestward for 800 miles, emptying into the Gulf of Cambay through an estuary beginning at Broach, 200 miles north of Bombay (Map: India, C 4). In the upper half of its course, below Jabalpur, it flows through a great depression between the Vindhya Mountains on the north and the Satpura Range on the south and is broken by numerous falls and rapids. In this valley, near Hoshangabad, are important deposits of coal and iron ore. In its lower course the river is broad and becomes a tidal stream 50 miles from its mouth. Seagoing vessels ascend the estuary to Broach on favorable tides, and the river is navigable 82 miles for large boats, while smaller ones can ascend 28 miles farther. The Nerbudda is to the Hindus one of the most sacred streams of India.

NEREID (nē'rē-ĭd) **MONUMENT.** The name given to a sculptured heroön at Xanthus in Lycia, dating from the end of the fifth century B.C. and discovered in 1838 by Sir Charles Fellows. The sculptures from the monument, preserved in the British Museum, show 10 female figures with dripping garments (the daughters of Nereus), which, with the shells and seaweed represented, gave the monument its name.

NEREIDS (Gk. Νηρηΐδες, Νηρεΐδες, *Nēreïdes*). Sea nymphs, daughters of Nereus (q.v.) and Doris, daughter of Oceanus. Their number is variously given, though 50 seems to have been the popular belief. We have, however, in the various lists some 77 different names. Few of them appear as individuals, and of these Thetis, mother of Achilles, Amphitrite, the wife of Poseidon, and Galatea, beloved by the Cyclops Polyphemus, are alone conspicuous. In art they appear frequently as spectators in scenes involving sea deities, as at the contest between Nereus and Hercules or the capture of Thetis by Peleus, while a favorite scene represents them as bringing to Achilles the armor made by Hephæstus. In the later art they appear riding on various sea monsters, sporting with Tritons, or attending on Poseidon and Amphitrite. The name has continued in the popular belief of the Greeks of to-day, but the Nereids are no longer sea maidens, but have become nymphs of the land. The old belief that one who saw a nymph might be smitten with madness reappears in the modern popular superstition, and it is thought dangerous to haunt their caves, and still more to be caught in the whirlwinds of dust raised in their dances. See Nymph.

NEREIS, nē'rē-ĭs. A genus of annelids

(family Nereidæ) having a long slender body, a distinct head, with tentacles and eyes. Flat lobes (parapodia) on either side in each somite carry leaflike gills. They are all marine and generally hide under rocks or in the sand. They swim actively by rapid and undulating inflections of the body and by the aid of numerous parapodia arranged along the sides. The proboscis is thick, strong, and armed with two jaws.

NEREITES, nē′rê-ī′tēz (Neo-Lat., from Lat. *Nereis,* Nereid). A peculiar fossil trail found in many of the Cambrian rocks of America and Europe and supposed to have been made by a crawling worm.

NEREOCYSTIS, nē′rê-ō-sĭs′tĭs, or BLADDER KELP. A genus of the giant kelps of the Pacific coast of North and South America. It has a long flexible stem (stipe) that swells at the end into a large globular float (the bladder), to which are attached large blades.

NERE′TUM. See NARDO.

NEREUS, nē′rê-ŭs *or* nē′rōōs (Gk. Νηρεύς). In Greek legend, an ancient sea divinity, son of Pontus (sea) and Gæa (earth) and father, by Doris, of the Nereids. He seems to have been worshiped at Gythium and probably elsewhere; but his cult was never prominent, and in legend he plays scarcely any other part than father of the Nereids, among whom was included Thetis, mother of Achilles. In the myths he is usually friendly and helpful, and his only contest is with Hercules, who, in order to learn the way to the Garden of the Hesperides, was obliged to wrestle with and hold Nereus, in spite of his manifold changes of shape.

NER′GAL. A prominent deity in the Babylonian and Assyrian pantheons. The name (probably better Nerigal) is assured by Hebrew, Aramaic, and Greek transliterations; it is unquestionably Sumerian; its meaning was given by Babylonian scholars as "lord of the great dwelling place," i.e., the nether world, though probably the original significance was "the rager." His original aspect seems to have been that of a solar deity, representing especially the blazing heat of the sun at noon or the summer solstice; thus, he is referred to as "the hero of the gods, the lofty meridian sun." As a destructive deity he became the god of war and the god of pestilence. He shares the former characteristic with Ninib, along with whom he also appears as the god of the chase. But he appears more uniquely as the god of pestilence, and so he became by an easy transition of thought the god of those whom he destroyed, and thus the deity of the lower world. Accordingly in the later mythology he stood for the declining sun, and the month of Chislev (December) is dedicated to him. This development in the character of Nergal is presented in a story preserved in an Amarna tablet, to the effect that the gods of the upper world became engaged in war with Eresh-kigal, the goddess of the nether world; Nergal as their leader makes his way into her presence, but is induced by her supplications to save her life and to marry her, so becoming the god of the lower world. With this may be compared the classic myth of Pluto and Proserpine. Nergal had also as wife Laz, probably an upper-world goddess. As god of war and destruction, Nergal was identified with the planet Mars, while the lion was his symbol, and the colossal winged lions with human heads at the entrance to the Assyrian palaces seem to have been called *Nirgallu.* Nergal's ancient sanctuary, with which he was always associated from earliest to latest times, was Cutha, the name of which even became a synonym of the nether world. Accordingly, the Cuthæan colony which was settled in Samaria after the deportation of Israel brought thither the cult of Nergal. (2 Kings xvii. 30.) His cult, however, was widespread, and is found in Syria, as recent excavations show, as early as in the first dynasty of Babylon (2232–1932 B.C.). Consult: Morris Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898); id., *Die Religion Babyloniens und Assyriens* (Giessen, 1902–12), Zimmern, in Eberhard Schrader, *Die Keilinschriften und das alte Testament* (3d ed., Berlin, 1902); Eduard Meyer, *Geschichte des Altertums,* vol. i, part ii (3d ed., Stuttgart, 1913).

NERI, nā′rê, PHILIP. See PHILIP NERI, SAINT.

NERIN′EA (Neo-Lat., from Lat. *Nerine,* variant of *Nereis,* Nereid). A genus of siphonostomate gastropods allied to the Cerithiidæ and exclusively restricted to the Mesozoic formations, where it is especially abundant in and characteristic of the Jurassic coral beds of Europe. The shell is long and turreted, with many whorls, and the columella always, and usually also the inner lip of the aperture, are ornamented with strong ridges. Longitudinal sections of the shell show that these ridges increase in size and complexity from the apex to the aperture of the shell, in other words, as the shell increases in growth from its young to its adult stage.

NERIS′SA. In Shakespeare's *Merchant of Venice,* the companion of Portia.

NE′RIUM. A subtropical plant. See OLEANDER.

NERNST, nĕrnst, WALTER (1864–). A German physicist, born at Briesen (West Prussia). He studied at the universities of Zurich, Berlin, Graz, and Würzburg; in 1887 was appointed assistant to Ostwald at Leipzig, and in 1889 lecturer in physical chemistry in the university. In 1891 he became professor at Göttingen, where in 1895 he also organized and became director of the institute for physical chemistry. In 1905 he was called to Berlin to occupy a similar position. In 1906 he delivered a series of lectures at Yale University, which were printed under the title *Experimental and Theoretical Applications of Thermodynamics to Chemistry* (1907). He is the inventor of the Nernst incandescent electric lamp, in which were employed one or more rods or glowers of rare earth oxides, such as zirconia or yttria. These, heated by an auxiliary coil, emit light when incandescent by the passage of the current. Considerable economy was promised for the Nernst lamp in comparison with those with carbon filaments, but the tungsten lamp proved more advantageous. Nernst's publications include: *Siede- und Schmelzpunkt, etc.* (1893); *Die Ziele der physikalischen Chemie* (1896); *Ueber die Bedeutung elektrischer Methoden und Theorieen für die Chemie* (1901); *Einführung in die mathematische Behandlung der Naturwissenschaften,* with Schoenflies (6th ed., 1910); *Physico-chemical Investigations of the Processes of Combustion in Gas Machines,* Russian text (1913); *Untersuchungen über die spezifische Wärme* (1914). See ELECTRIC LIGHTING.

NERNST LAMP. See ELECTRIC LIGHTING.

NERNST'S HEAT THEOREM. An interesting thermodynamic principle introduced by Walter Nernst and elaborated by Nernst, Planck, and others. The basal idea of the theorem is that a material body cannot possibly be cooled down to the absolute zero of temperature. A number of important consequences follow from Nernst's heat theorem, and among other things it permits of calculating the equilibrium constants of chemical reactions, and therefore the so-called affinities of the reactions, on the basis of certain physical properties of the reacting substances. (See REACTION, CHEMICAL.) Nernst believes his theorem to constitute a third principle of thermodynamics (q.v.).

NE'RO (37–68 A.D.). A Roman emperor (54–68 A.D.). He was born at Antium, on the coast of Latium, Dec. 15, 37 A.D., and was the son of Cn. Domitius Ahenobarbus and of Agrippina the younger, the daughter of Germanicus Cæsar, and sister of Caligula; his name was thus originally L. Domitius Ahenobarbus. His mother afterward became the wife of the Emperor Claudius, who adopted him (50 A.D.), and his name was changed to Nero Claudius Cæsar Drusus Germanicus. After the death of Claudius (54 A.D.), the Prætorian Guards, at the instigation of Afranius Burrus, their prefect, declared him Emperor, instead of Claudius' son Britannicus, and their choice was acknowledged both by the Senate and the provinces. His reign began under the guidance of Burrus and his tutor, Seneca, the philosopher. For a time all went well, but the influence of his mother, together with his own moral weakness and sensuality, frustrated their efforts, and he soon plunged into debauchery, extravagance, and tyranny. He caused Britannicus, the son of Claudius, to be poisoned at the age of 14, because he dreaded him as a rival, and afterward (59 A.D.) procured the death of his own mother, Agrippina, to please his mistress, Poppæa Sabina. She was the wife of his principal boon companion, Otho, afterward Emperor, and in order to marry her he divorced and afterward put to death his wife Octavia, the sister of Britannicus (62 A.D.). The affairs of the Empire were at this time far from tranquil. In 61 A.D. an insurrection broke out in Britain among the Iceni under their Queen, Boadicea (q.v.), which was, however, suppressed by Suetonius Paulinus. The following year saw an unsuccessful war against the Parthians in Armenia. At home matters were not much better. The Emperor was lampooned in verse; the Senate and priesthood, alike venal, were also satirized by audacious malcontents; Burrus died, and even Seneca removed from court. In July, 64, occurred a great conflagration in Rome, by which two-thirds of the city were reduced to ashes. Nero himself was charged in ancient times with having been the incendiary (Tacitus, *Annales*, xv, 44); the charge has been often believed in modern days. It is said that he admired the spectacle from a distance, reciting verses about the burning of Troy, but many scholars are doubtful whether he really had any hand in it. At all events, to offset the charge in his own day, and to minimize the popular disfavor caused by this grievous calamity, he laid the blame on the Christians, and persecuted them with great fury. He rebuilt the city with great magnificence, and reared for himself a splendid palace extending from the Palatine Hill over the intervening valley to the slopes of the Esquiline, called, from the immense profusion of its golden ornaments, the *Domus Aurea* (Golden House). To provide for this expenditure, and for the gratification of the Roman populace by spectacles and distributions of grain, Italy and the provinces were unsparingly plundered. A conspiracy against him failed in the year 65, and Seneca and the poet Lucan fell victims to his vengeance. In a fit of passion he killed his wife Poppæa. He then proposed marriage to Antonia, the daughter of Claudius, but was refused, whereupon he caused her to be put to death, and married Statilia Messalina, after killing her husband. His vanity led him to seek distinction as a poet, a philosopher, an actor, and a musician, and he received applause, not only in Italy, but also in Greece, which, upon invitation of the Greek cities, he visited in 67. In 68 the Gallic and Spanish legions, and after them the Prætorian Guards, rose against him, proclaimed Galba Emperor, and Nero fled from Rome to Phaon. The Senate, hitherto subservient, declared him an enemy of his country, and the tyrant committed suicide. Consult: Tacitus, *Annales*, xiii–xvi; Suetonius, *Nero;* Schiller, *Nero* (Berlin, 1872); B. W. Henderson, *Life and Principate of the Emperor Nero* (Philadelphia, 1903); the article "Claudius, 28," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. i (8th ed., Leipzig, 1914).

NER'OLI, OIL OF. See ORANGE OIL.

NERTCHINSK, nyĕr'chĭnsk. A district town in the Territory of Transbaikalia, Siberia, situated on the Nertcha and the Trans-Siberian Railway, 184 miles east of Tchita, the capital of the territory (Map: Asia, N 3). It is poorly built. It has a small museum and a library. The inhabitants are engaged chiefly in the cultivation of tobacco and vegetables, and in the fur trade, of which Nertchinsk is still an important centre. The town was founded in 1656 over a mile from its present site. It soon rose to great importance as the centre of the trade with China. With the rise of Kiakhta (q.v.) Nertchinsk lost in commercial importance, but it soon became the centre of an extensive mining region and received many immigrants, a considerable proportion being convicts. By the Treaty of Nertchinsk, concluded in 1689, the two rivers of Argun and Gorbitsa and the Stanovoi mountain chain were fixed upon as the boundary lines between Siberia and Manchuria. The mining industry in the vicinity of Nertchinsk is now of secondary importance. Pop., 1897, 6713, including about 1200 exiles; in 1914 it had increased to about 11,300 inhabitants.

NER'THUS. In Northern mythology, a goddess worshiped by the tribes of northern Germany, among whom she journeyed at intervals, bringing peace and fertility. Her shrine was an island, sometimes identified with Rügen. She is also called Hertha, from a former reading of the passage in Tacitus in which she is mentioned.

NERUDA, nĕ'rụ-dȧ, JAN (1834–91). A Bohemian poet, journalist, and novelist, born at Prague. He was educated at the university in his native city, and began to write under the pseudonym of Janko Hovora. His early poetical works belong to the Romantic school, new in Bohemia in his time, and he was influenced by the contemporary movement in the same direction in Germany. His volumes of verse include: *Hřbitovní kvĭtí* (Flowers from the Cemetery, 1858); *Knihy vešů* (Book of Verse, 1868);

Písně kosmické (Cosmic Songs, 1878), of philosophic character; *Ballady, a romance* (Ballads and Romances, 1883), written in the spirit of the Czech folk songs; *Prosté motify* (Plain Motives, 1883), his lyric masterpiece; and the posthumous *Friday Songs* (1896), whose mystic and patriotic ideas are wholly at variance with the beliefs of Neruda's youth. He also wrote several plays of lesser importance. Neruda was connected with various newspapers as editor and contributor; in conjunction with Hálek (q.v.) he founded the review *Květy* in 1866, and much of his best work appeared in the *Národní Listy*, for which he was feuilletonist and literary and dramatic critic from 1865 to 1891. His prose masterpiece, the studies of middle-class life in Prague called *Malostranské povídky*, was published in 1878. Others of his sketches and novels are: *Arabesky* (1864); *Různí lidé* (All Sorts of People, 1871); *Obrazy z ciziny* (Pictures from Abroad, 1872); and *Feuilletony* (1876 et seq.), all remarkable for humor, observation, and a style full of charm. His complete works were edited by Herrmann in 1891–99 (Prague).

NERUDA (NORMANN-NERUDA), WILMA MARIA FRANCISCA (1839–1911). A European violinist, born at Brünn in Moravia, where her father was organist of the cathedral. She became a pupil of Jansa, and made her first appearance at Vienna, in 1846. In 1849 she went to London to play at the Philharmonic in one of De Bériot's concerts. She then returned to the Continent and passed several years traveling as a soloist, chiefly in Russia. In 1864 she visited Paris and played with great success at the Pasdeloup concerts, the Conservatory, and elsewhere. In the same year she was married to Ludwig Normann, a Swedish musician. She returned to London in 1869, again taking part in the Philharmonic; in the winter following she played the first violin at the Monday Popular Concerts; and in 1888 married Sir Charles Hallé, with whom she toured Australia in 1890–91. She visited the United States in 1899. Her tours were a succession of triumphs. She died in Berlin.

NER'VA, FORUM OF, or FORUM TRANSITORIUM. The fourth of the Imperial fora at Rome, formed from the highway which separated the Forum of Peace from the Forum of Augustus. As the main thoroughfare between the Subura and the Forum Romanum and between the various Imperial fora (see FORUM), it was called Forum Transitorium or Forum Pervium. It was also called Forum Palladium, from the temple of Minerva (Pallas), of which two Corinthian columns remain, the temple having been destroyed in 1606 to build the chapel of St. Paul in the church of Santa Maria Maggiore. Consult S. B. Platner, *The Topography and Monuments of Ancient Rome* (2d ed., Boston, 1911).

NERVA, MARCUS COCCEIUS. A Roman emperor (96–98 A.D.). He was born 35 A.D., of a family belonging to Narnia in Umbria, and twice held the consulship before his election by the Senate, at the bidding of the people and the soldiers, to the dignity of Emperor, after the murder of Domitian. He displayed great wisdom and moderation, rectified the administration of justice, and diminished the taxes; he provided also for the maintenance, at public expense, of the children of poor parents in the towns of Italy; but finding himself, on account of his advanced age, not vigorous enough to repress the Prætorian Guards, he adopted M. Ulpius Trajanus, then at the head of the Army of Germany, who succeeded him on his death, Jan. 25, 98. After his decease he was deified. (See APOTHEOSIS.) Consult the article "Cocceius, 6," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. i (8th ed., Leipzig, 1914).

NERVA COCCEIUS, or NERVA MARCUS. See COCCEIUS, NERVA.

NERVAL, nâr'vâl', GÉRARD DE. A French writer. See GÉRARD DE NERVAL.

NERVE. See NERVOUS SYSTEM AND BRAIN.

NERVE STRETCHING. A treatment of forcibly extending a nerve (neurotomy). It is used in severe, chronic neuralgia of certain nerve trunks (sciatic nerve, trigeminal nerve, etc.). The treatment consists in massage and in certain movements of the affected area or in a surgical operation, by which the nerve is exposed, raised, and stretched for several minutes. See NEURALGIA; SCIATICA.

NERVI, nĕr'vē. A town in the Province of Genoa, Italy, situated on the seacoast, 6 miles east of Genoa. It is a favorite winter health resort of the eastern Riviera, with a fine park and promenades. In the vicinity are groves of lemons, oranges, and olives. Pop. (commune), 1901, 6766; 1911, 6745.

NERVII, nĕr'vĭ-ī. An ancient tribe in Gallia Belgica, north of the Ambiani. In the time of Cæsar, who first mentions them (*De Bello Gallico*, i, 1; ii, 4–28), they were a warlike people who prohibited trade with their neighbors, forbade the introduction of luxuries, and attempted to make an alliance of the surrounding tribes against the Romans. Cæsar subdued them in 57 B.C.

NER'VOUS DISEASE. An affection of any part of the nervous system, either of the brain, spinal cord, sympathetic nerves, or peripheral nerves. Diseases of the nervous system are divided into functional and organic. In the latter local anatomical alteration of nerve structure is apparent. There are in reality no such things as functional diseases. While not seen or described, undoubtedly anatomical changes are present in many cases; and in others there are lesions at a distance which constitute the real disease, while the symptoms which occupy the attention are the result of reflex action. It cannot be affirmed that there are no structural changes in nerve fibres in so-called functional diseases of the nervous system, which constitute the bulk of nervous diseases. There are a large number of special nervous diseases, which may be functional or be associated with lesions in the brain, spinal cord, or peripheral nerves.

Nervous diseases are, first, morbid manifestations of demonstrably disturbed nerve elements, and, second, so-called functional disorders in which actual changes in the physical properties of the nervous system have not yet been discovered. The latter are commonly called neuroses and are steadily tending to enter the former category under improved methods of research. In many nervous diseases heredity is a marked feature, and in the acquired diseases of the nervous system heredity may play a predisposing part.

There is a general belief that nervous diseases are increasing in frequency. Absolute statements, however, are impossible, as many causa-

tive conditions are changing and other newly recognized nervous diseases are being added to the known list. For instance, the infectious diseases, such as smallpox, typhoid, diphtheria, and malaria, are all capable of producing organic and functional nervous diseases. Their control by preventive medicine and hygiene correspondingly reduces that liability. Civilization, on the other hand, by conserving the unfit and prolonging the life of the feeble and neurotic, entails additional nervous disturbances and susceptibilities. There can be no doubt that modern urban conditions favor the development of nervous instability and at the same time bring to bear the additional highly competent noxious influences of vice, particularly through alcoholic and drug habits and venereal diseases. Yet statistics collected in 1914 by the National Education Association apparently show that in early life at least, mental defectiveness is considerably higher in the country than in large cities. Figures gathered from 25 cities and rural districts gave an average of 0.8 per cent of mental defect in rural children as compared with 0.2 per cent in city children. Inbreeding, together with bad hygienic surroundings, probably accounts for the poor showing, both mental and physical, made by rural school children. The monotony and hardships of farm life, however, are also a factor of morbidity and are particularly active among the women so situated. Some occupations bear either a direct or predisposing relation to nervous ailments. Writer's cramp and the entire group of occupation neuroses of which it is a type show this feature. Workers in metal, especially lead, phosphorus, mercury, arsenic, those subjected to inhalation of various gases, and those whose occupation tempts them to indulge in liquors, are liable to nervous disorders. Work entailing exposure to cold or wet or increased atmospheric pressure, and that attended by great mental strain or monotony, furnish predisposing factors.

In their proper place are found articles on the following nervous diseases or conditions: APOPLEXY; CAISSON DISEASE; CATALEPSY; CHOREA; EMBOLISM; EPILEPSY; FACIAL NEURALGIA; HYSTERIA; INSOMNIA; LOCOMOTOR ATAXIA; MENINGITIS; MYELITIS; NEURASTHENIA; NEURALGIA; NEURITIS; NEUROSIS (including occupation neuroses); NEUROTIC; PARALYSIS; THROMBOSIS; ETC. There is also an article on NEUROLOGY. In addition there are articles in the domain of psychiatry, on DIPSOMANIA; INSANITY; KLEPTOMANIA; MANIA; MELANCHOLIA; MONOMANIA; PARANOIA; PARESIS; PYROMANIA; PUERPERAL INSANITY, ETC., as well as on IDIOCY and IMBECILITY.

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NERVOUSNESS. A condition of unstable nervous equilibrium, which is largely temperamental. A person afflicted with nervousness startles easily at sudden sounds, is unduly emotional, lacks poise and self-possession. If the condition go beyond these limits, actual disease is present and the person is a neurasthenic, i.e., a sufferer from nerve exhaustion. This state is characterized by unfounded feelings of apprehension, tremor, headache, disordered digestion, insomnia, loss of power of application, and irritability. Overwork, excesses, and disease may cause nervousness in normally stable people, which disappears when the cause, often obscure, is removed. See NEURASTHENIA.

NERVOUS SYSTEM, EVOLUTION OF THE. The nervous system comprises those tissues that have the property of irritability or of sensitiveness to external influences, and whose function it is to mediate between the outer world and the inner and to convey to the muscles and other organs motor impulses so as to bring about movements harmonious and advantageous to the organism. In the nervous system also are centred those phenomena which we designate as thought, reason, will, etc. The origin of the nervous system is apparently independent of that of the muscular system, but the development of nervous tissue accompanies that of the contractile organs. In the most primitive organisms, such as the amœba, the whole protoplasm of the animal body is sensitive to external influences; there is a diffuse irritability. Thus, the whole body of the amœba moves away from strong light. Moreover, it has the ability to move with reference to objects that stimulate it in some physical or chemical way.

Lower Invertebrates. In the Metazoa the nervous system develops in the ectoderm or outer layer of the body wall, which is the region that comes in contact with the outside world and hence is the one in which we should expect sensitiveness to become first developed and localized. Some of the cœlenterates have in the ectoderm superficial sensory cells with which the nerve cells are in contact. Fibres from the nerve cells connect in turn with the fibrillar part of the muscle cells. In the flatworms the nervous system is almost completely separated from the epithelium and lies in or close under the dermal musculature, and a brain is best developed in some of the Polycladida and some trematodes. The nervous system of echinoderms has a development unknown in other animals. It is composed of three independent systems: (1) the superficial oral, (2) the apical oral, and (3) the deeper oral. The superficial oral consists of a ring around the œsophagus and of radial nerves which branch out from this ring to the arms and radii. This system innervates the intestine, ambulacral feet, and integument. The nervous system of Mollusca is of a complex type of its own, but shows some affinities to that of annelids and arthropods. In its simplest form (chitons) it consists of a cerebral part, from which four pairs of commissures are sent off. Passing ventrally from it there is a ring with ganglia, and passing backward two pairs of commissures, one called pedal and the other pallial. All of these contain ganglion cells along their whole length and send off various branches and commissures. The pallial commissures are united posteriorly. In the Pelecypoda the nervous system is somewhat more complex, but it is always symmetrical and consists of two ganglia, the cerebropleural, one on each side of the gullet and united above by a commissure. Each ganglion gives off a nerve

cord, which passes downward and backward to the bilobed pedal ganglion of the foot. Directly backward from the cerebral ganglia also proceed two other cords to the bilobed, fused, visceral ganglion, situated on the ventral side of the posterior adductor muscle; this ganglion sends out branches to the palps and mantle. The pedal ganglion innervates the foot, the viscera, the enteric canal, the heart, the gills, and a part of the mantle. The nervous system of gastropods varies in the different groups both in regard to the arrangement of the ganglia and the commissures. There is usually a pair of ganglia near together or some distance apart, which lie above the gullet and produce the visceral nerve cords behind. The visceral cords pass eventually into a pair of ganglia, but only after they have passed through the pleural ganglia. Pedal and buccal ganglia with their commissures also exist.

The nervous system of annelids is well developed and has a bilateral and metameric arrangement. It consists of the bilobed cerebral ganglion or brain and of a double ventral chain of ganglia and commissures. The brain lies in the prostomium or a little farther back, as in the case of the earthworm. Branches are given off from it to the eyes, tentacles, and sensory epithelium. Two lateral commissures from it pass ventrally around the alimentary canal and unite below it into the double ventral nerve chain. One ganglion occurs in this nerve chain for each segment. In some forms the halves of the chain are widely separated and are united by transverse commissures. The arrangement of the nervous system of arthropods is essentially like that of annelids. There is a supraœsophageal ganglion or brain that gives off commissures which pass downward and backward to unite with the first ganglion of the ventral nerve chain. Various degrees of concentration of the nervous system occur throughout the Crustacea and the insects. The higher Crustacea, as well as the insects, have a visceral nervous system. The brain of insects is relatively large and is lobed.

Vertebrates. The nervous system of the higher vertebrates consists of a double chain of ganglia lying in the median line on the dorsal side of the body, which consists of the spinal cord and the brain. The segmental origin of the spinal cord is shown by the regular repetition of the spinal nerves that branch out from it in pairs, one on each side. The visceral or sympathetic system of vertebrates consists of a series of ganglia on each side of the vertebral column. Fibres connect this system with the spinal and cranial nerves. Nerves from the neural axis pass to all the various sense organs, muscles, and glands. The spinal cord is made up of two kinds of nervous matter, a superficial white layer and an internal H-shaped rod of gray matter. The cord merges gradually into the brain, which has a bilateral form and consists, in its simplest form, of three parts, the forebrain, midbrain, and hindbrain. The two lobes of the cerebrum comprise the most anterior part of the brain. The midbrain connects the fore and hind brain. The hindbrain includes the bilobed cerebellum on its dorsal side and the pons Varolii and medulla oblongata on the ventral side. The brain is made up of two kinds of nervous matter, the white and the gray. Its surface is much convoluted, so as to give a greater surface for the gray matter which forms the outer coating. The cranial nerves arise from the lower surface of the brain.

The brain of the Acrania (*Amphioxus*) is the enlarged anterior end of the neural axis, and in it the central canal enlarges to form the ventricle. The ventricle opens dorsally to the exterior of the brain. Anterior to the opening there is a pocket known as the olfactory lobe. The brains of cyclostomes and teleosts represent a low stage of development in that they possess an unpaired prosencephalon whose dorsal wall, the cortex cerebri, consists of a single layer of cells covered by the pia mater. In the larva of cyclostomes (*Ammocetes*) the metencephalon is the largest part of the brain. Selachians possess a more complicated brain. They lead an active, predatory life, and correspondingly the prosencephalon is relatively large and shows a slight furrow or division into two lateral parts or lobes. A prominent pair of bulbi olfactorii pass from in front to the nose. The thalamencephalon gives rise to two small optic thalami, and there are other modifications in the rest of the brain which render it a more complex organ. There is a bundle of fibres from each side of the prosencephalon that probably corresponds to the crus cerebri of mammals. The brains of ganoids and dipnoans resemble those of amphibians in the absence of the lobi inferiores. In all three the cerebral hemispheres show a marked development. The cerebellum exists only as a small fold at the anterior end of the medulla. In the Anura the optic lobes are well developed.

In Reptilia, as in Amphibia, the cerebellum is small. A well-developed median eyelike structure, the pineal eye, is present on the root of the midbrain. The prosencephalon is the largest part of the brain. It is paired, and its surface is smooth. There is a large olfactory lobe and a well-developed corpus striatum. The avian brain is characterized by a considerable cranial flexure, by large cerebral lobes, by a cerebellum. In sagittal section the latter shows the arbor-vitæ structure so evident in the brain of man. Externally the brain is folded transversely or convoluted. The mammalian brain exhibits in the different groups a steady growth in complexity from the reptilian to the human condition. The cranial flexure is most pronounced in the mammalian brain.

That the degree of development of the different organs within the group of mammals is dependent upon their functional activity can hardly be doubted. Thus, the pyramids are the motor nerves coming from the coördinating centres of movement. These are relatively small in the dolphins, which possess no hinder extremities. The frontal lobe of the cerebrum, upon which probably many of the higher functions, such as speech, depend, are best developed in man; so, too, the olfactory lobes are reduced in man in correspondence with the rudimentary condition of their function in man. While the midbrain is more or less exposed in some of the lower mammals (e.g., marsupials, rodents, and insectivores), the hemispheres come gradually to cover the entire brain. The mammalian brain is characterized by the presence of large commissures, the corpus callosum and fornix, which connect the hemispheres. The pons Varolii is another large commissure and connects the two lateral lobes of the cerebellum, and a number of other bands serve as connectives. In mammals the midbrain is relatively smaller than in other vertebrates. The brain of Tertiary mammals was relatively small. The reduction was especially evident in the hemispheres. In many points of

structure their brain, too, was reptilian in character, although the possessors were related to groups as high as ungulates.

Three main and well-defined types of nervous system may be determined in the animal kingdom. There is first the radial type, such as has been described for the starfish. This consists of a ring of nervous tissue in the disk which surrounds the œsophagus and sends out a branch to each arm. This is the echinoderm type. Another type is the symmetrical, bilateral type of annelids and arthropods, to which the nervous system of mollusks may also be relegated. This type consists of a brain ganglion above the œsophagus, with commissures that pass around and below the digestive tract, where they unite ventrally with a chain of ganglia extending posteriorly. The pedal ganglion of mollusks represents the subœsophageal ganglion. The rest of the ventral chain is absent in unsegmented mollusks. The third type of nervous system is the bilateral type of vertebrates. Here the double nerve cord, segmental in origin, as is shown by the repetition of paired spinal nerves, lies on the dorsal side of the alimentary tract. Except in *Amphioxus* the vertebrate nerve cord widens anteriorly into a large and complex ganglion mass, the brain. The sympathetic system, which appears first in leeches and arthropods, is an almost independent nervous system, for while it is in direct union with the other nervous system, it is not at all under its control.

Sense Organs. As soon as sense organs appear the nervous elements of animals consist of three parts: (1) the so-called terminal, end, or sense organ, (2) the ganglia, and (3) the nerves. End organs appear first clearly defined in the Cœlenterata, although the pigment spots of *Euglena* are in a particularly sensitive region in that infusorian. The sense organs of the Cœlenterates are most developed in the medusæ and consist of the tentaculocysts with calcareous lithites, pigment spots or ocelli, and sensory pits known as olfactory pits. Pigment cells or eyespots are found in many of the flatworms, some of the polyclads possessing several hundred. These eyes, in many forms, are grouped in pairs at the anterior end of the body or are scattered along the anterior margin or even along the entire margin of the body. In many forms the eyes are simple pigment spots. In others a refractive body occurs. In triclads and polyclads the eye consists of a pigmented apparatus with retinal or light-perceiving cells within a cup-shaped organ. These cells connect with the optic nerve. Auditory organs also occur in the flatworms, each consisting of a fluid-filled sphere lying close to the brain in which is an otolith. The skin is everywhere very sensitive, owing to tactile hairs, especially on the tentacles. The proboscis of certain forms contains an invagination which is capable of extrusion and is believed to be a touching organ. The suckers of trematodes, too, are especially sensitive. There are ciliated pits in the epithelium of triclads and other forms to which an olfactory function has been ascribed.

Sense organs occur over the whole integument of mollusks. These cells, when in exposed positions, may have a tactile function. The pallial sensory organs and the ospharadium, which occur near the gills, are probably olfactory organs to test the condition of the water. The optic tentacles of pulmonates and the dorsal tentacles of opisthobranchs are stated by some authorities to be olfactory organs. Ciliated ridges in the mantle furrows of certain chitons are supposed to have an olfactory function. Auditory organs are absent in the Amphineura alone among mollusks. The auditory organ consists of a closed, fluid-filled vesicle, or otocyst, in which a varying number of otoliths are inclosed. Sensory cells occur on the wall of the otocyst, which bear sensory hairs. The otocysts of cephalopods have been shown to have a statical function also. The simplest visual organs of mollusks are optic pits. The retina lies at the base of the pit, and along this base the optic nerve spreads out. The retina consists of cells with and without pigment. External to the retina is a gelatinous cuticle or even a lens. By the approach and fusion of the edges of the pit the vesicular eye is formed. That part of the epithelium which is free from pigment constitutes the cornea. This type of eye occurs on the tentacles of gastropods. By a further development the simple cuplike eye is differentiated into the complex, highly developed organ of cephalopods. The mantle eyes of the scallop resemble vertebrate eyes in that the visual rods are turned away from the light, that is to say, they are directed towards the body.

The sense organs of echinoderms comprise the auditory organs and eyes. The auditory organs are of two types. The first type is represented in holothurians and consists of an otocyst which is lined with ciliated epithelium, container and otolith, and filled with fluid. In echinoids is found the second type of auditory or orienting organs, which are believed to be transformed spines. Organs of this type are known as sphæridia and are developed only on the oral side; they are spherical, stalked bodies and may be inclosed in a pit of the test. The organs of special sense in the annelids are the eyes, tentacles, cirri, and otocysts. The structure of the eye, when that organ is present, is very simple. The eyes are confined to the prostomium, but there are eyelike organs on many or all the body segments or on the branchial filaments of many species. Eyes are lacking in nearly all Oligochæta and some of the Polychæta. The eye is usually a capsule with a layer of elongated cells on the side towards the brain. A thickening of the cuticle may form a lens. Otocysts with otoliths are not common. Tactile cells occur generally all over the body and especially on the prostomium.

The organs of special sense in arthropods are eyes, olfactory setæ, auditory organs, and organs of touch. The eyes are of two sorts, median eyes and a pair of faceted, compound eyes. The median or nauplius eyes sometimes occur in the larvæ only and are composed of a cuticular lens and a group of specially modified epidermal cells. The paired, compound eyes are covered by a transparent cuticle. A single visual element of the compound eye is called an ommatidium. Each element is composed of two parts, an outer vitreous and an inner sensory group of cells. The latter is known as the rhabdome and is made up of the retinule and a refracting rod. Each ommatidium is in a state of optical isolation. Fibres pass from the optic ganglia to the retinule. The organs of touch are bristled cells on the appendages, especially on the antennæ, the palpi, and on other parts of the body. The olfactory organs of the crayfish consist of a number of delicate setæ borne on the antennules. The auditory organ is a pit upon the exterior and is lined with auditory setæ. Grains of sand

in the case of Crustaceæ often serve the function of otoliths. These must be renewed after each molt.

Amphioxus possesses an olfactory pit. It is a ciliated depression at the level of the anterior end of the brain. It is connected with the olfactory lobe of the brain. This pit may correspond with the pituitary body of Urochorda and Craniata. The organ of sight is merely a pigment spot. It is median and without a lens. Cells supposed to have a sensory function occur on the roof of the oral hood, and tactile cells occur on the buccal cirri.

The organs of special sense of vertebrates comprise various kinds of tactile organs, of which may be mentioned the lateral-line organs, which in structure resemble the organs of chætopods. The lateral-line organs occur in amphibians and fishes and are supposed to perceive vibrations in the water and also to have an auditory function. End-bulb organs likewise occur here and there over the entire surface of fishes. From amphibians upward they are restricted to the mouth. Specialized tactile cells, such as the Pacinian corpuscles of the duck's beak, occur in different vertebrates.

The olfactory organ in fishes is a pair of sensory pits near the anterior end of the snout. From the Dipnoi onward these pits communicate with the mouth cavity as well as with the exterior. From the Dipnoi onward also these organs are more or less inclosed either in a cartilaginous capsule or they are included in the cranium. The internal nostrils with their glands are developed in Dipnoi and Amphibia. The nasal cavity of Lacertilia is divided into an outer and an inner part. From the crocodiles onward the nasal organs recede in correspondence with the forward extension of the facial region. Both in reptiles and birds there is only one true turbinal bone in the nasal canal. Because of the extreme facial development of the skull of mammals, the nasal cavity is proportionately larger. The turbinals consequently greatly develop here. The nasal cavity of mammals communicates with certain sinuses of the face.

The sensitive elements of the vertebrate eye develop from outgrowths, primary optic vesicles, of the brain. The pigment epithelium develops from an inpocketing of this vesicle. The lens develops from thickened epidermal cells. In cyclostomes the lens and iris are absent and the sclerotic and cornea are undifferentiated. A globular lens is present in the eyes of true fishes. Amphibian eyes are simpler than those of fishes, but a ciliary muscle is present. The sclerotic is cartilaginous with bony plates even in lizards and birds. The eyeball of nocturnal birds is elongated and tubular. The iris of birds may be highly colored, owing to the presence both of pigment and of fat globules. The eye of mammals is more or less inclosed in the bony orbit, the sclerotic is fibrous, and the fibres of the optic nerve pass into the retinal cells. The retina is histologically a complicated structure and consists of seven layers; the light must pass through all the layers in order to reach the innermost rod and cone layer. The region of acutest vision is the fovea centralis, where only the cones persist.

As to auditory organs, it is the sacculus and cochlea in the vertebrate ear that attain a higher and higher degree of development. In fishes the cochlea is a knoblike appendage of the sacculus. In amphibians it is constricted off from the sacculus and only remains connected by a strand of cells. In mammals the cochlea becomes spirally coiled. There are three coils in man. A chain of three auditory ossicles appears in the higher vertebrates.

Consult: Lang, "Ueber primäre Metamerie des Neuralrohres der Vertebraten," in *Sitzungsberichte der königlich baierischen Akademie der Wissenschaften* (Munich, 1885); id., *Text-Book of Comparative Anatomy* (London, 1891–96); J. S. Kingsley, *Text-Book of Vertebrate Zoölogy* (New York, 1899); R. E. E. Wiedersheim, *Comparative Anatomy of Vertebrates*, translated by W. N. Parker (3d ed., ib., 1907); and, for a popular but reliable review, the chapter on "The Nervous System," in G. H. Parker, *Biology and Social Problems* (Boston, 1914).

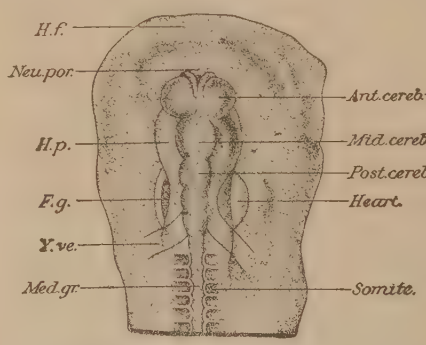
NERVOUS SYSTEM AND BRAIN. Historical. It is impossible in an article such as the present to do more than touch upon some of the more important investigations which have brought us to our present conception of the nervous system. Up to the eighteenth century very little progress was made in the study of the structure of the nervous system, though some work was done upon the gross anatomy of the brain by men whose names remain to us in our anatomical nomenclature. Thus, Vesalius, Fallopius, and Eustachius were among the earliest. To the philosopher Descartes in the earlier part of the seventeenth century belongs the honor of the first recorded description which gives any intelligent conception of the structure of the nervous system. His drawings of the brain possess a very fair degree of accuracy as regards general shape, though the lobes and convolutions appear much distorted. He pictured the nerves as originating in the brain and described their function as the carrying of the animal spirits from the brain to the periphery. In the seventeenth century we have Willis, whose name we recognize in the circle of Willis, and who described the basal ganglia, the pyramids and the olives, and enumerated nine pairs of cranial nerves; Vieussens, whose name is familiar in the valve of Vieussens; and Duboise, whose medical cognomen of Sylvius marks that prominent sulcus of the cerebrum. The results of the labors of these investigators, as well as those of Van Leeuwenhoek, Malacarne, Rolando, Vico d'Azyr, Arnold, Monro, and others, were collected and summed up in an extensive volume published by Burdach in 1819. Von Sömmering made very important researches on the brain, eye, and ear, recognizing 12 pairs of cerebral nerves (1796). Descartes had discovered the nerve fibre, and the next step forward in the histology of the nervous system was not taken until Ehrenberg in 1833 discovered the nerve cell in the spinal ganglia. This discovery was emphasized when four years later Purkinje observed the presence of cells not only in the ganglia, but in the cerebrum and cerebellum. The important fact that the dorsal roots of the spinal nerves are concerned with sensation and the ventral roots with motion was discovered by Sir Charles Bell, an eminent British surgeon and anatomist, and communicated by him to the Royal Society of London in 1822. In 1838 Remak discovered that the cells of the sympathetic ganglia had processes, and that these were connected with nerve fibres. The importance of this discovery, confirmed in 1842 by Helmholtz, was not at the time ap-

preciated. One of the most careful studies of nerve cells and their processes was made by Otto Deiters of Bonn and published after the investigator's death by Max Schultze in 1865. Deiters divided the processes given off from nerve cells into two kinds—protoplasmic processes, which branched rapidly and the structure of which resembled that of the cell body, and axis cylinder or nervous processes, which were often continuous with the axis cylinders of medullated nerves. Gerlach's publication in 1872 was far-reaching in its influence. By the use of the chloride-of-gold method, he was able to demonstrate many more and finer processes of nerve cells than had been recognized by the older methods of staining. These delicate processes were believed by Gerlach to form a diffuse nervous network within the gray matter. Besides describing this nervous network, Gerlach formulated on this basis a theory of nervous-system structure which was accepted by most neurologists until the advent of the so-called newer investigations. Gerlach believed that from the anterior horn cells of the spinal cord processes passed directly off to form the motor roots of the spinal nerves. According to his theory the protoplasmic processes of these cells ramified in the gray matter of the cord, where they anastomosed with protoplasmic processes from other cells, forming a reticulum from which arose the fibres which passed out of the cord as the posterior or sensory roots. Gerlach believed that this same relation of afferent and efferent fibres to the nerve cells and to the reticulum obtained throughout the entire nervous system, which thus consisted of a remarkably complex continuum of nervous protoplasm.

The so-called newer investigations upon which is based our present conception of the structure of the nervous system must be considered as beginning with the discovery by Golgi of his staining method. This was announced in 1873, although it was not until 10 years later, when Golgi published a considerable volume of his investigations, that the neurological world began to realize the importance of his discovery. To the later investigations of Golgi, His, Kölliker, Van Gehuchten, Forel, Retzius, Ramón y Cajal, Von Lenhossek, Flourens, and others must be ascribed the overthrow of Gerlach's theory of a diffuse nervous network and the practical establishment of the now accepted neuron theory of nervous-system structure.

Methods of Neurological Investigation. The history of the development of our knowledge of the structure of the nervous system is necessarily intimately associated with the history of advances in methods of investigation. Among the general methods which have proved of greatest value in working out the structure of the nervous system the following may be mentioned: (1) *Method of Anatomical Dissection.*—Only the coarser fibre tracts can be determined by this method, its main use being in studying the gross anatomy of the nervous system. (2) *Method of Embryology.*—The extreme value of this method is shown by the important investigations of His. By means of this method it is possible to study the development of the neuron from its first appearance to its adult condition and to observe how groups of neurons become separated off by themselves to form the different parts of the nervous system. Of especial importance is the fact that the fibres of different systems of neurons acquire their medullary sheaths at different embryonic ages. In this way it is possible, by studying the nervous systems of embryos of different ages, to distinguish many of the fibre systems. (3) *Method of Pathology.*—This is based upon the fact that any disease or injury which destroys the cell bodies of neurons, or which interrupts the continuity of their axons, causes degeneration in the axons whose cells are destroyed or whose continuity is interrupted. Thus, e.g., in an injury crushing the spinal cord at a certain level, there will be found degenerated above the point of injury all fibres whose cells lie below the injury, while below the injury there will be found degenerated all fibres whose cells lie above the injury. More recently it has been determined that not only does the distal portion of a cut nerve or cut fibre tract die, but that in disease of peripheral nerves changes take place in the central stump and in the cells from which the diseased axons originate. It has thus been possible in some cases to determine the cells from which diseased nerves spring. (4) *Method of Arrested Development.*—This method depends upon the fact that there sometimes occur abnormalities in the nervous system, such as absence or malformation of a part, thus causing an absence of development in other parts dependent upon them. (5) *Method of Animal Experimentation.*—This method consists essentially in subjecting animals to certain conditions which cause changes in the nervous system and then studying those changes.

Most of our knowledge of the nervous system has been acquired by the application to these general methods of certain special staining methods. Of these the four most important are the methods of Weigert, Golgi, Nissl, and Ehrlich. For the details of these methods the reader is referred to textbooks on histology and histological technique.



ANTERIOR PORTION OF THE BODY OF A CHICK.

The head distinctly differentiated, seen from the surface. *H. f.*, head fold; *Neu. por.*, neuroporus; *H. p.*, head plate; *F. g.*, foregut; *Y. ve.*, yolk vein; *Med. gr.*, medullary groove; *Ant. cereb. ves.*, anterior cerebral vesicle; *Mid. cereb. ves.*, middle cerebral vesicle; *Post. cereb. ves.*, posterior cerebral vesicle.

Development. The differentiation of the nervous system begins very early in embryonic life. There is first the formation of a groove or furrow in the outer layer of the blastoderm. This is known as the medullary or neural groove. By an increase of the cells at the sides of the groove and their union dorsally, this groove is converted into a closed canal, the neural or medullary canal. This canal corresponds to the central canal of the spinal

cord and to the ventricles of the brain in the adult nervous system, and it is from the epiblastic cells surrounding the medullary canal that the entire nervous system is developed. At that end of the canal which corresponds to the head of the embryo, three dilations appear. These are known respectively as the forebrain (anterior cerebral vesicle—telencephalon), the midbrain (middle cerebral vesicle—mesencephalon), and the hindbrain (posterior cerebral vesicle—metencephalon). These three vesicles soon become five from the development from the forebrain of the interbrain or diencephalon, and from the hindbrain of the afterbrain or myelencephalon. From the anterior cerebral vesicles are developed the cerebral hemispheres, the corpus callosum, the corpora striata, fornix, lateral ventricles, olfactory bulbs, and the optic thalami. From the middle cerebral vesicle are developed the corpora quadrigemina, the crura cerebri, and the aqueduct of Sylvius. From the posterior cerebral vesicles are developed the cerebellum, pons, and medulla oblongata. From the remaining undilated portion of the medullary canal is formed the spinal cord. During the closure of the canal there become separated off at varying intervals groups of cells which form the cerebrospinal ganglia. Histologically two kinds of cells may be observed in the walls of the medullary canal, spongioblasts and neuroblasts. From the former is developed the neuroglia or connective tissue of the nervous system, from the latter the nervous elements or neurons. The neuroblast is at first a small round cell. It soon becomes pear-shaped, and from the small end a process grows out—the axis cylinder process or axon. Other processes of a different nature appear later. They are known as protoplasmic processes or dendrites. This nerve cell with all its processes is known as the neuron.

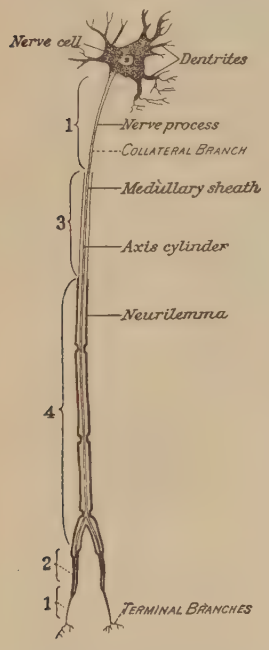
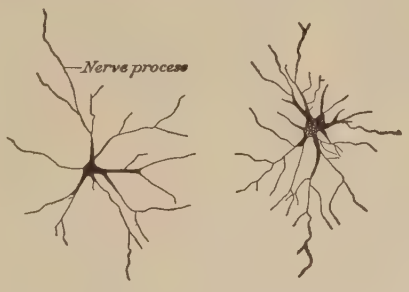


DIAGRAM OF A NEURON.

1, nerve process naked; 2, enveloped only by neurilemma; 3, enveloped only by medullary sheath; 4, enveloped by both medullary sheath and neurilemma.

Nervous Tissue. The structural element of nervous tissue is the neuron. This has already been defined as the nerve cell with all its branches. These neurons in their association with one another to form the organs of the nervous system are supported by a peculiar type of connective tissue called neuroglia. As noted before in describing its development, each adult neuron consists of a cell body and two kinds of processes, the axis cylinder and the dendritic processes. The cell body, as in most other cells, consists of a mass of protoplasm containing a nucleus.

Our knowledge of the internal structure of the nerve cell has been greatly enhanced within the last few years by the application of a new staining process known as the method of Nissl. This consists essentially in placing fresh tissue in some quick fixative such as absolute alcohol, staining sections with such a dye as methylene blue, and using a differentiating fluid composed of colorless aniline oil and alcohol. This method demonstrates two very different types of cell in the nervous tissues. In one of these the nucleus alone stains, in the other both nucleus and cell body are stained. The former are known as caryochrome cells, the latter as somatochrome cells. The structure of a somatochrome cell as shown by the method of Nissl is as follows: The rather large nucleus situated in the centre of the cell resembles the nuclei of other cells, being surrounded by a nuclear membrane and traversed by an intranuclear network, both of which stain blue. The nucleoplasm, or basement substance of the nucleus, remains unstained. Within each nucleus is a darkly staining nucleolus. The body of the cell shows three distinct elements in its structure—a basement substance, a cytoreticulum or fibrillar element, and chromophilic bodies. The basement substance is unstained by Nissl's method and appears homogeneous. Traversing this basement substance may be seen very delicate fibrils. This fibrillar structure extends not only throughout the body of the cell, but also into the dendrites and the axis cylinder, possibly as far as these processes themselves extend. The chromophilic bodies are blue-staining, granular masses scattered throughout the cell body. The size and arrangement of these bodies differ greatly in different cells, and are quite characteristic for certain types of cells. In addition to the elements already described, there is

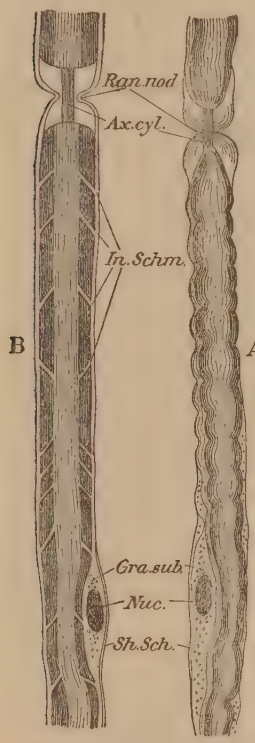


TWO FORMS OF MULTIPOLAR NERVE CELLS.

From the ventral horn of the spinal cord of a newborn rabbit, showing the richly branched protoplasmic processes. (Schäfer.)

present in many nerve cells more or less yellow or brown pigment. This pigment is absent in the nerve cells of the newborn child. The internal structure of the dendrites is similar to that of the cell body. They usually branch rapidly and end in the gray matter near their cell of origin. The method of Golgi shows them to be covered with little knoblike projections known as gemmules. The axon differs from both cell body and dendrites in that it contains no chromophilic bodies. It arises from a portion of the cell called the axon hill, which is also free from chromophilic bodies. In Golgi preparations the axon is distinguished by its fineness, its straight course, approximately uniform diameter, and its few branches. These few branches pass off at right angles and

are known as collaterals. In some cells the axon branches rapidly and ends in the gray matter near its cell of origin. Other axons pass into the white matter and become axis cylinders of nerve fibres. At its origin from the cell body and at its termination, the axon is uncovered by any sheath. Some axons—confined to the gray matter—are entirely devoid of any covering. Other axons—fibres of Remak, found mainly in the sympathetic system—are covered by a delicate sheath known as the neurilemma or sheath of Schwann. The axons of the white matter of the brain and cord are protected by a thick sheath called the medullary sheath. The axons of the peripheral cranial and spinal nerves are covered by a medullary sheath and outside of this a neurilemma. Such axons, with their sheaths, are known as medullated nerve fibres. A medullated nerve fibre thus consists of a central core or axis cylinder which is continuous throughout the fibre and is the axon of a nerve cell. This axis cylinder is covered by a rather thick sheath of a fatty nature known as the medullary or myelin sheath, outside of which is the delicate neurilemma. From the neurilemma fine septa, called the incisures of Schmidt, extend into the myelin. At intervals the medullary sheath is interrupted and the axis cylinder is uncovered or covered only by the neurilemma. These points are known as the nodes of Ranvier, and the portion of the nerve fibre between two nodes as an internodal segment.



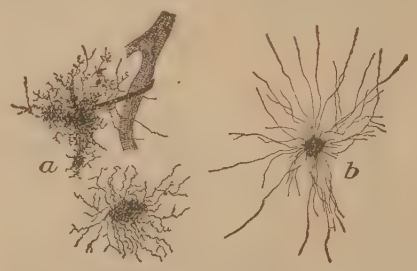
MEDULLATED NERVE FIBRES (OSMIC ACID).

A, view; *B*, section. *Ran. nod.*, Ranvier's nodes, where the medullary sheath is interrupted and the axis cylinder appears; *Ax. cyl.*, axis cylinder; *In. Schm.*, incisures of Schmidt; *Gra. sub.*, granular substance at the poles of the nucleus; *Nuc.*, nucleus; *Sh. Sch.*, sheath of Schwann.

As to the physiological significance of these different parts of the neuron, our ideas are still based largely upon theoretical grounds. The cell body has been shown to be the birth or genetic centre of the neuron. From the fact that any portion of the neuron which is cut off from the cell body dies, the cell would seem to be the nutritive or trophic centre of the neuron. From the absence of nervous activity in portions of the neuron which have been cut off from their cell of origin, the cell body would also appear to be the functional centre of the neuron. The most generally accepted theories of the significance of the component parts of the cell itself may be summed up as follows. The function of the nucleus is to preside over the constructive activities of the neuron, by which food products brought to the cell by the lymph are transformed into food elements of the cell, and finally into its nervous elements proper. The basement substance and the chromophilic bodies represent the food elements of the cell. The cytoreticulum represents the working nervous mechanism of the cell, it alone being concerned in the reception, transformation, and emission of the nervous impulse. Of the processes, the axon is centrifugal in function, carrying impulses away from the cell body; the dendrites are centripetal in function, bringing impulses to the cell body. Neurons are associated with one another by approximation or by contact, and not by continuity of their protoplasm; i.e., no two neurons are believed to be directly connected with each other. The axonal terminations of one neuron simply lie in contiguity, or at most in touch, with the dendrites or cell bodies of other neurons, the impulse passing over from one to the other.

Neuroglia, or the connective tissue of the nervous system, differs both in structure and in origin from the connective tissue found in other organs. As already stated, it is epiblastic in origin, developing like the neuron from the cells which line the embryonic neural canal. These cells, at first morphologically identical, soon differentiate into neuroblasts, or future neurons, and spongioblasts, or future neuroglia cells.

In adult neuroglia two main types of cells are found, spider cells and mossy cells. The spider cell has a rather small body, from which are given off on all sides straight, unbranching, spinelike processes. They occur mainly in the white matter. The mossy cell has a rather large body. Its processes are fewer, are coarse, rough, and branching; they occur mainly in connection with blood vessels. As in the case of the nerve cell, the processes of these cells do not anastomose, but interlace.



CELLS FROM SECTIONS OF THE BRAIN OF ADULT MAN.

a, mossy cell; *b*, spider cell.

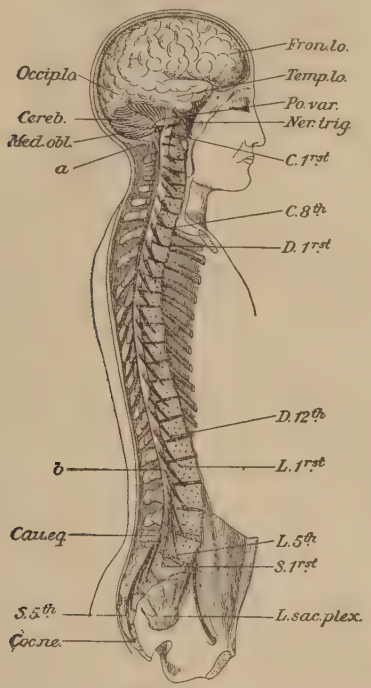
In all vertebrated animals the nervous system is composed of two distinct portions or systems, viz., the cerebrospinal and sympathetic or ganglionic.

The *cerebrospinal system* includes the brain and spinal cord (which form the cerebrospinal axis, or central nervous system) and the cranial and spinal nerves. It was termed by Bichat the nervous system of animal life, since it presides over such distinctly animal functions as sensation, motion, and intellect, and comprises all the nervous organs concerned in sensation, volition, and mental action.

The *sympathetic system* consists essentially of a chain of ganglia connected by nervous cords, which extends from the cranium to the pelvis,

along each side of the vertebral column, and from which nerves with large ganglionic masses proceed to the viscera and blood vessels in the cavities of the chest, abdomen, and pelvis. It was termed by Bichat the nervous system of organic life, since it seems to regulate—almost or quite independently of the will—the due performance of the functions of the organs of respiration, circulation, and digestion.

The Central Nervous System. The brain and spinal cord are covered and protected by the *meninges*—three membranes, the dura mater,



VIEW OF THE CEREBROSPINAL AXIS.

The right half of the cranium and trunk of the body have been removed by a vertical section; the membranes of the right side of the brain and spinal cord have been cleared away, and the roots and first part of the fifth and twelfth cranial nerves, and of all of the spinal nerves of the right side, have been dissected out and laid separately on the wall of the skull and on the several vertebræ opposite to the place of their natural exit from the craniospinal cavity.

Fron. lo., frontal lobe; *Temp. lo.*, temporal lobe; *Occip. lo.*, occipital lobe; *Cereb.*, cerebellum; *Po. var.*, pons Varolii; *Med. obl.*, medulla oblongata; *a* and *b*, upper and lower extremities of the spinal cord; *Cau. eq.* on the last lumbar vertebral spine marks the cauda equina; *Ner. trig.*, the three principal branches of the neryus trigeminus; *C. 1st*, the suboccipital or first cervical nerve; *C. 8th*, the eighth or lowest cervical nerve; *D. 1st*, the first dorsal nerve; *D. 12th*, the last dorsal nerve; *L. 1st*, the first lumbar nerve; *L. 5th*, the last lumbar nerve; *S. 1st*, the first sacral nerve; *S. 5th*, the fifth sacral nerve; *L. sac. plex.*, the left sacral plexus; *Coc. ne.*, the coccygeal nerve.

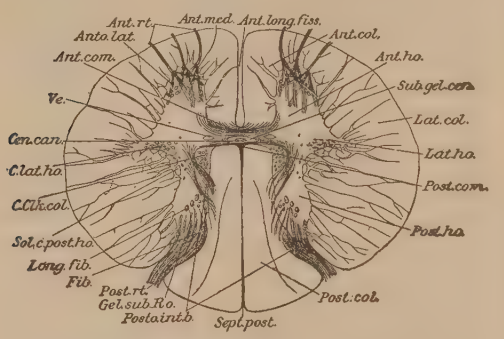
the arachnoid, and the pia mater. The dura mater is a strong fibrous membrane, which supplies the cranial bones with blood in early life and adheres firmly to their inner surface. The arachnoid (so called from its being supposed to be as thin as a spider's web) consists of a parietal and a visceral layer. The parietal layer adheres to the inner surface of the dura mater, while the visceral layer somewhat loosely invests the brain and spinal cord, from direct contact with which, however, it is separated by the intervention of the pia mater and some loose areolar tissue. The pia mater is an extremely vascular membrane, consisting of minute blood vessels, held together by fine areolar tissue. It dips down between the convolutions and fissures of the brain, and is prolonged into the interior, forming the velum interpositum and the choroid plexuses of the fourth ventricle. By means of this membrane the blood vessels are conveyed into the nervous substance.

The Cerebrospinal Nervous System. In describing this it is more convenient to begin with a description of the spinal cord, the study of which is essential to a proper appreciation of the higher and more complicated centres.

The *spinal cord* is that portion of the cerebrospinal axis which is contained in the spinal canal. It extends from the upper border of the first cervical vertebra or atlas above to the middle or lower margin of the first lumbar vertebra below. The cord is continuous superiorly with the medulla oblongata, while its lower extremity tapers off into a slender cord, the filum terminale. At two levels, one in the cervical and one in the lumbar region, the diameter of the cord is considerably larger than elsewhere. These are known respectively as the cervical and the lumbar enlargements. The posterior median septum and the anterior median fissure almost divide the cord longitudinally into two symmetrical halves, while the spinal nerve roots serve to divide it into segments. These segments correspond in number to the spinal nerves. There are thus eight cervical, twelve dorsal, five lumbar, five sacral, and one or two coccygeal segments. The internal structure of the cord can be best appreciated by studying a transverse section through the cervical enlargement stained by Weigert's method. Such a section shows that two substances enter into its composition, one situated centrally, the other on the periphery. On account of their appearance in fresh tissues, the former is called gray matter, the latter white matter. The gray matter is made up mainly of cells and their dendrites and of nonmedullated axons; the white matter consists mainly of medullated nerve fibres, its whiteness being due to the myelin. The gray matter is distributed somewhat in the form of the letter H. Posteriorly it is slender and almost touches the surface—posterior horns—while anteriorly it is broad—anterior horns—and separated from the surface by a considerable layer of white matter. The expanded tip of the posterior horn is known as the head or caput, and contains a gelatinous substance, the substantia gelatinosa of Rolando. The narrow portion connecting the head with the central gray matter is called the neck or cervix. Laterally the gray matter extends out somewhat into the white matter as the lateral horn or processus reticularis lateralis. The gray horns of the two sides of the cord are connected by a commissure containing the central canal. In fœtal life this canal is open and continuous with the ventricles of the brain. In adults it is usually more or less obliterated. It is surrounded by the substantia gelatinosa centralis, and divides the gray commissure into an anterior gray commissure and a posterior gray commissure. Passing out from the anterior horns to the surface of the cord are bundles of fibres which constitute the anterior or motor spinal nerve roots. Just to the median side of the posterior horns are seen the entering fibres of the posterior or sensory nerve roots.

By the posterior horns the white matter of the cord is divided into posterior columns and anterolateral columns, the latter being again rather indefinitely subdivided by the fibres of the anterior roots into lateral and anterior columns. The posterior columns are also usually subdivided at this level by a connective tissue septum from the pia mater into an internal portion, the column of Goll, and an external portion, the column of Burdach.

Fibre Systems or Tracts of the Cord. As already noted, the cell bodies of the neurons are grouped in the gray matter of the brain and cord in the ganglia of the cranial and of the spinal nerves and in the end organs of certain of the nerves of special sense. This grouping is for definite physiological purposes. The axons from many of these neuron groups pass into the white matter as distinct bundles and constitute fibre systems or fibre tracts. In the normal adult cord these various tracts of fibres present the same appearance and cannot be differentiated from one another. Embryological and pathological studies enable us to distinguish the following systems: 1. Descending tracts: (*a*) the direct pyramidal tract or column of Türck; (*b*) the crossed pyramidal tract; (*c*) the descending comma tract of the posterior column; (*d*) the descending cerebellar tract of Loewenthal. 2. Ascending tracts: (*a*) the column of Goll; (*b*) the column of Burdach; (*c*) the column of Lissauer; (*d*) the direct cerebellar tract, posterolateral ascending tract, or tract of Flechsig; (*e*) the tract of Gowers, or the anterolateral ascending

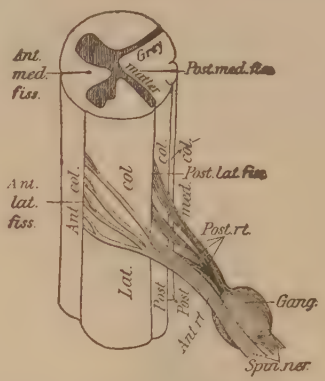


TRANSVERSE SECTION OF THE HUMAN SPINAL CORD AT THE LEVEL OF THE EIGHTH DORSAL VERTEBRA.

Ant. long. fiss., anterior longitudinal fissure; *Sept. post.*, septum posterius; *Ant. med.*, anterior medial group of ganglion cells; *Ant. com.*, anterior commissure; *Sub. gel. cen.*, substantia gelatinosa centralis; *Cen. can.*, central canal; *Post. com.*, posterior commissure; *Ve.*, vein; *Ant. ho.*, anterior horn; *Lat. ho.*, lateral horn, and behind it the processus reticularis; *Post. ho.*, posterior horn; *Anto. lat.*, antero median group of ganglionic cells; *C. lat. ho.*, cells of the lateral horn; *C. Clk. col.*, cells of Clark's column; *Sol. c. post. ho.*, solitary cells of the posterior horn; *Ant. rt.* anterior root; *Post. rt.*, posterior root; *Posto. int. b.*, postero-internal bundle; *Fib.*, bundle of fibres attached to the posterior root; *Long. fib.*, longitudinal fibres of the posterior cornu; *Gel. sub. Ro.*, gelatinous substance of Rolando; *Ant. col.*, anterior column; *Lat. col.*, lateral column; *Post. col.*, posterior column.

tract. 3. Short systems, fundamental columns or ground bundles, composed of short ascending and descending fibres intermingled.

Location of the Fibre Systems of the Cord and Origin of their Fibres. The direct pyramidal tract occupies a small oval area adjacent to the anterior fissure. It decreases in size as it passes downward and disappears entirely in the middle or lower dorsal regions. The crossed pyramidal tract occupies the posterolateral region of the cord. In the cervical and dorsal regions it is separated from the surface by the direct cerebellar tract. In the lumbar region the latter tract is no longer present and the

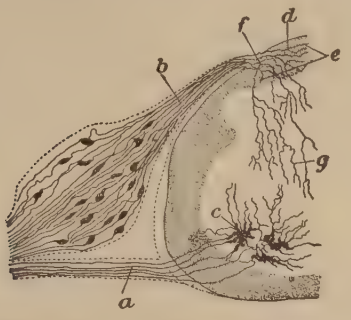


SPINAL CORD. DIAGRAMMATIC SIDE VIEW.

Plan of the fissures and columns. *Post. med. fiss.*, posterior median fissure; *Post. lat. fiss.*, posterior lateral fissure; *Post. rt.*, posterior root; *Gang.*, ganglion; *Spin. ner.*, spinal nerve; *Ant. med. fiss.*, anterior median fissure; *Ant. lat. fiss.*, anterior lateral fissure; *Ant. rt.*, anterior root; *Ant. col.*, anterior column; *Lat. col.*, lateral column; *Post. col.*, posterior column; *Post. med. col.*, posterior median column.

crossed pyramidal comes to the surface. This tract extends to the lowermost part of the cord, decreasing in size as it descends. The fibres of the pyramidal tracts are axons of cells situated in the brain in the region of the fissure of Rolando or motor area. These fibres descend through the internal capsule, pons, and medulla. In the medulla they form a large bundle of fibres known as the anterior pyramids, lying on either side of the anterior fissure. At the junction of medulla and cord most of these fibres cross over, in what is called the pyramidal decussation, to the opposite posterolateral region, to continue down the cord as the crossed pyramidal tract. A small number of fibres remain in the anterior region and pass down the cord as the direct pyramidal tract. Both tracts as they descend send collaterals and terminals into the gray matter of the anterior horns, where they end in arborizations around the motor cells there situated. These tracts thus constitute the motor pathway connecting the brain and cord, carrying voluntary motor impulses from the brain to the cells of the anterior horns, which latter directly control muscular movements. The descending comma tract is a small tract of fibres in the dorsal region situated about the middle of the column of Burdach. By some investigators it is believed to represent descending branches from posterior root fibres; by others, descending axons of cells situated in the cord. The descending cerebellar tract, or tract of Loewenthal, consists of descending axons of neurons whose cells are situated in the cerebellum. These axons end in the gray matter of the cord. The column of Goll and the column of Burdach are composed of the axons of the cells of the ganglia of the posterior roots of the spinal nerves. Entering the posterior columns, they divide into ascending and descending arms. The latter is short and soon ends in the gray matter. The ascending arm may be short, of medium length, or long. The short and medium-length fibres end in the gray matter of the

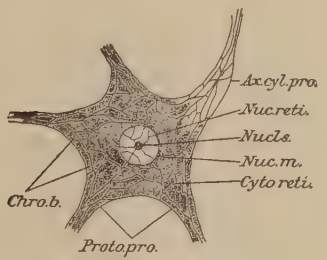
cord, after sending in collaterals at different levels. The long fibres pass up to the medulla and end, those of the column of Goll in the nucleus gracilis, those of the column of Bur-



TRANSVERSE SECTION OF THE SPINAL CORD OF A CHICK ON THE NINTH DAY OF INCUBATION.

a, axis cylinders of anterior root fibres issuing from large cells of the anterior horn, *c*; *b*, posterior root fibres passing from the bipolar cells of the spinal ganglion into the posterior column of the spinal cord, *d*, when they bifurcate, and *e*, when they become longitudinal; *f* and *g*, collaterals from the fibres passing into the gray matter.

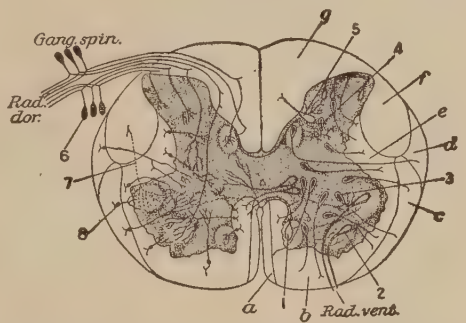
dach in the nucleus cuneatus. The column of Lissauer consists of the shortest fibres which enter the posterior roots. These fibres end in the posterior horns. These neurons, whose central axons form the entering fibres of the posterior roots of the spinal nerves taken in connection with the analogous sensory roots of the cranial nerves, constitute the peripheral sensory neuron system. It is by means of these neurons that all impulses are conveyed from the surface of the body to the cord and brain. By their influence over the motor cells of the cord they determine the direct reflex actions. By their influence over other cells situated in the cord, medulla, and midbrain, sensory impressions are transmitted through other systems of neurons to the brain, and thus enter into consciousness. By their influence upon motor cells of the cortex they complete the cycle of a sensory impression entering consciousness and being transformed into a voluntary motion. The



LARGE GANGLION CELL OF THE VENTRAL ROOTS OF THE SPINAL CORD.

Ax. cyl. pro., axis cylinder process; *Nuc. reti.*, nucleoreticulum; *Nucls.*, nucleolus; *Nuc. m.*, nuclear membrane; *Cytoreti.*, cytoreticulum; *Chro. b.*, chromophilic bodies; *Proto. pro.*, protoplasmic processes.

direct cerebellar tract, or dorsolateral ascending tract, lies near the lateral surface of the cord from the posterior horn to about the mid-lateral point. It begins in the upper lumbar region and extends to the cerebellum. Its fibres are axons of the cells of Clark's column or the nucleus dorsalis of the same side. This nucleus is a group of cells lying in the gray matter just to the median side of the base of the posterior horn. It extends as a continuous column from the mid-lumbar to the lower cervical region. In the medulla the direct cerebellar tract enters the restiform body and thus reaches the cerebellum by means of the inferior cerebellar peduncle. Gowers's tract, or the ventrolateral ascending tract, lies along the periphery of the cord from the anterior limit of the direct cerebellar to the anterior nerve roots. The tract first appears in the upper lumbar cord, and increases in size as it passes upward. Its fibres are axons of cells scattered through the gray matter of the same and opposite sides of the cord. Many of the fibres of this tract are probably spinal association fibres and reënter the gray matter to terminate there. Other fibres, however, pass upward to higher centres, their exact terminations being as yet undetermined. The remainder of the white matter of the cord is constituted by the short fibre systems (fundamental columns or ground bundles). It will be seen that in the main these short fibres lie adjacent to the gray matter and are more extensive in the anterior part of the cord.



SCHEME OF THE STRUCTURE OF THE SPINAL CORD.

a, fasciculus cerebrospinalis ventralis; *b*, fasciculus ventralis proprius; *c*, fasciculus ventrolateralis Gowersi; *d*, fasciculus cerebellospinalis; *e*, fasciculus cerebrospinalis lateralis; *f*, fasciculus lateralis proprius; *g*, funiculus dorsalis; *Rad. dor.*, radix dorsalis; *Rad. vent.*, radix ventralis; *Gang. spin.*, ganglion spinale; 1, commissural cell, or heteromeric neurons; one is seen sending its axon into the gray substance of the other side, the others send their axons into the white matter of the opposite side; 2, motor cells; sides of fibrils are seen arising from their axons; 3, tautomeric neurons, the axons going to the ventral and lateral funiculi; among these are cells in the nucleus dorsalis and some of the cells in the substantia gelatinosa Rolandi, collaterals are coming off from the axons; 4, a Golgi cell, or dendraxon; 5, cells sending their axons to the dorsal funiculi; 6, cell bodies of peripheral sensory neurons situated in the ganglion spinale; their central prolongations are shown entering the spinal cord as dorsal root fibres which bifurcating send collaterals to terminate in different parts of the substantia grisea; 7, collaterals and terminals representing fibres from the fasciculi cerebrospinales or pyramidal tract; 8, collaterals from the white fibres in the ventral and lateral funiculi.

They are axons of cells situated in the gray matter of the cord. These axons enter the white matter, pass up or down, or, splitting, send one branch up, the other down, and finally terminate in the gray matter. Along their course they send collaterals into the gray matter. These fibres of the fundamental columns thus serve to connect the gray matter of different levels of the cord, and may be considered of the nature of longitudinal commissural fibre systems. By means of these neurons an impulse coming into the cord by the posterior nerve root may be conveyed to many motor or sensory cells within the gray matter. In this way are accomplished the more complex reflex actions.

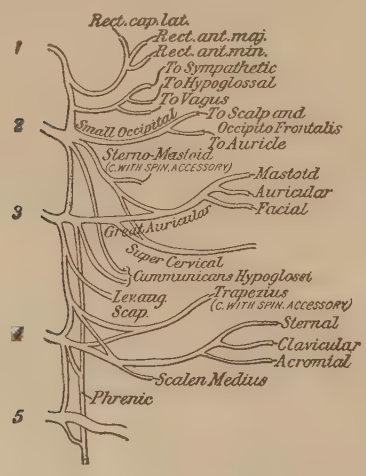
Nerve Cells of the Cord. In describing the origin of fibre systems of the cord, many of the

cells of the cord have been necessarily referred to, e.g., those cells the axons of which form the columns of Gowers and of Flechsig, and the fundamental columns. There are also found in the gray matter cells which have short axons which never leave the gray matter, but terminate in the vicinity of their cells of origin. The most important groups of cells remaining to be described are those of the anterior horns connected with the motor spinal nerve roots. These are large multipolar cells rich in chromatic substance. They are arranged in columns, two long columns extending the entire length of the cord for the innervation of the muscles of the trunk, while in the cervical and lumbar enlargements extra columns are added for the supply of the muscles of the extremities.

The Spinal Nerves. These are the peripheral nerves connected with the spinal cord. There are 31 pairs of spinal nerves, which are named from the levels of the cord from which they originate: 8 cervical, 12 dorsal, 5 lumbar, 5 sacral, and 1 coccygeal. Each spinal nerve is connected with the cord by two roots, as anterior or motor root and a posterior or sensory root. The anterior root consists of axons of the motor cells of the anterior horns. These pass out in small bundles, by the ganglion of the posterior root, beyond which they join the fibres from the ganglion to form the mixed nerve. The fibres of the sensory root have been already described in connection with the posterior columns. These are the central processes of the spinal ganglion cells. Their peripheral processes pass out of the outer end of the ganglion and join the motor fibres. The nerves leave the spinal canal through the intervertebral foramina, beyond which each nerve divides into two branches, a posterior and an anterior.

The posterior divisions of the spinal nerves are smaller than the anterior, and are distributed to the muscles and skin of the back.

The anterior divisions of the spinal nerves supply the anterior parts of the body and the

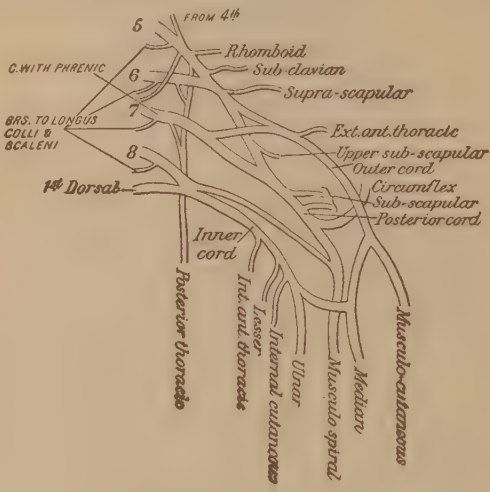


PLAN OF CERVICAL PLEXUS.

extremities. Each anterior branch is connected by some slender filaments with the sympathetic. In the dorsal region the anterior divisions are separate and distributed quite evenly, but in the cervical, lumbar, and sacral regions they unite to form intricate plexuses.

The *cervical plexus* is formed by the anterior divisions of the first four cervical nerves. The branches of distribution of this plexus may be divided into a superficial and a deep set, the former supplying the integument and superficial muscles of the side and front of the neck and upper part of the throat; the latter supplying the deeper muscles of the neck and sending one important branch, the phrenic, to the diaphragm.

The *brachial plexus* is formed by the anterior divisions of the last four cervical and the first

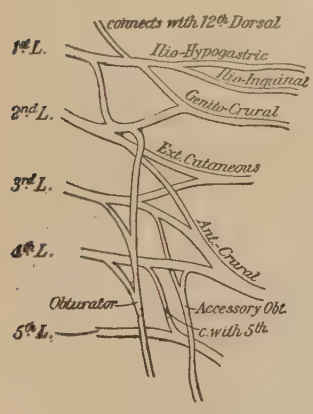


PLAN OF THE BRACHIAL PLEXUS.

dorsal nerves. These five nerves unite to form three main cords known respectively as the outer, the inner, and the posterior cords of the brachial plexus. Before uniting to form these cords, four main branches or sets of branches are given off. These are (1) a communicating branch to the phrenic; (2) muscular branches to the longus colli, scaleni, rhomboidei, and subclavius; (3) posterior thoracic nerve, to the serratus magnus; (4) the suprascapular, sending branches to supply the supra and infra spinatus. From the three main cords of the plexus branches are given off to the chest, shoulders, and arms. Those to the chest are the external and internal anterior thoracic, which supply the pectoralis major and pectoralis minor muscles. The branches to the shoulder are the subscapular and the circumflex, the former supplying the subscapularis, the latissimus dorsi, and the teres major; the latter supplying the deltoid and the teres minor. The circumflex nerve also supplies part of the integument of the shoulder and sends filaments to the musculocutaneous nerve. This nerve in the arm supplies the biceps, coracobrachialis, and part of the brachialis anticus muscles. In the forearm it becomes cutaneous, supplying the integument on the radial side. The internal cutaneous is a small nerve supplying the integument of the front of the arm and forearm. The lesser internal cutaneous, or nerve of Wrisberg, the smallest branch of the plexus, supplies the integument on the inner side of the arm. The musculospiral supplies the triceps, anconeus, supinator longus, extensor carpi radialis longior, and part of the brachialis anticus. It sends a cutaneous branch to the skin of the outer part of the forearm. It then divides into radial

and posterior interosseous branches, the former passing to the skin of the radial side of the hand, including thumb, index, middle and radial side of ring fingers; the latter supplying the carpal articulations and muscles of the back of the forearm. The ulnar nerve supplies the flexor carpi ulnaris and inner part of the flexor profundus digitorum. In the hand it supplies the adductor and part of the short flexor of the thumb, the interossei, the two inner lumbricales, and the muscles of the ball of the little finger. It gives off a cutaneous branch to the back of the little and ulnar side of the ring fingers and to the front of the same fingers. It also furnishes articular branches to the elbow and wrist joints. The median nerve supplies all the flexors and pronators of the forearm except those supplied by the ulnar. In the hand it supplies the two outer lumbrical muscles, part of the short flexor of the thumb, the opponens and the abductor. It also innervates the skin of the palm and of the palmar surfaces of the fingers not supplied by the ulnar.

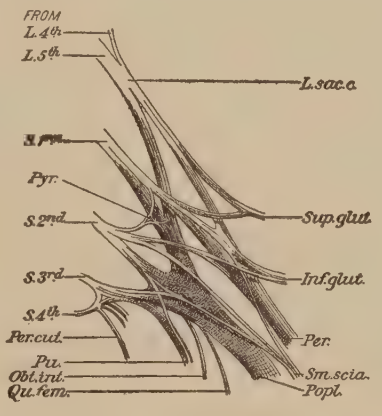
The *lumbar plexus* lies at the back of the abdominal cavity behind the peritoneum. It is formed by the anterior divisions of the four upper lumbar nerves. Communicating branches connect the plexus with the lumbar ganglia of the sympathetic. Some muscular branches pass directly from the plexus to the quadratus lumborum and psoas muscles. Cutaneous branches are the (1) iliohypogastric, which sends an iliac branch to the skin of the buttock and a hypogastric branch to the skin of the lower abdomen; (2) the ilioinguinal, to the skin of the groin; (3) the external cutaneous, to the skin of the outer side of the thigh. Mixed branches of the plexus are (1) the genitocrural, to the skin of the groin and to the cremaster muscle; (2) the anterior crural, a large and important branch which supplies the sartorius, the pectinæus, the psoas, the iliacus, and the extensors of the knee joint, besides giving off three cutaneous branches, the internal cutaneous to the skin of the inner aspect of the thigh, a middle cutaneous to the skin of the front of the thigh, and the long saphenous to the skin of the inner side of the knee, leg, and foot; (3) the obturator, which supplies the obturator externus, the adductor longus, gracilis, and adductor magnus. Branches of this nerve sometimes pass to the adductor brevis and pectinæus. It forms the main nerve supply of the hip and knee joints, and sometimes sends a cutaneous branch to the skin of the lower and inner part of the thigh. There is sometimes an accessory obturator nerve to the pectinæus and hip joint. It is usually connected with the obturator.



PLAN OF LUMBAR PLEXUS.

The *lumbosacral cord* is formed by the union of the fifth lumbar nerve with a branch from the fourth lumbar. It gives rise to a communicating branch to the fifth lumbar ganglion of the sympathetic, and a muscular branch, the superior gluteal, to the gluteus medius and minimus and the tensor fasciæ femoris, after which the cord joins the sacral plexus.

The *sacral plexus* is formed by the union of the lumbosacral cord with the first, second, third, and part of the fourth sacral nerves. It is a large plexus situated in the cavity of the pelvis. Like the other plexuses, it gives rise to communicating muscular and mixed branches. The communicating branches pass to the upper sacral sympathetic ganglia. The muscular branches supply the quadratus femoris, the obturator internus, the gemelli, the pyriformis, and a part of the gluteus maximus. The mixed nerves are: (1) The small sciatic, which supplies part of the gluteus maximus and the skin of the back part of the thigh, buttock, popliteal space, and part of the leg. By means of the long pudendal branch it also supplies the skin of the perineum. (2) The pudic supplies the muscles and skin of the external generative organs. (3) The great sciatic. This nerve is the largest nerve of the body. It passes down the back of the thigh, giving off branches to the adductor magnus and the hamstring muscles. Above the popliteal space the nerve divides into the internal and the external popliteal branches. The internal popliteal sends a branch to the knee joint and supplies the popliteus muscle and the muscles of the calf of the leg. It furnishes a branch called the communicans tibialis, which joins the communicans peronei to form the external saphenous nerve, which supplies the outer side of the foot. Below, the internal popliteal is continued into the posterior tibial, which supplies the long flexor of the toes, the tibialis posticus, and the skin of the heel. In the foot it divides into the internal and the external plantar nerves. The former supplies the skin of the sole of the foot and the great, second, third, and inner side of the fourth toes, the flexor brevis pollicis, the flexor brevis digitorum, the abductor pollicis, and the two inner lumbrical muscles; the latter supplies the skin of the little and outer side of the fourth toes and the muscles of the sole of the foot not supplied by the internal plantar. The external



THE SACRAL PLEXUS OF THE RIGHT SIDE FROM BEHIND.

L. sac. c., lumbosacral cord; *Sup. glut.*, superior gluteal; *Inf. glut.*, inferior gluteal; *Per.*, perforating; *Sm. scia.*, small sciatic; *Popl.*, popliteal: *Pyr.*, nerves to pyriformis; *Per. cut.*, perforating cutaneous; *Obt. int.*, obturator internus; *Qu. fem.*, quadrator femoris; *Pu.*, pudic.

popliteal sends branches to the knee joint, gives off the communicans peroneus to the skin of the outer side of the back of the leg, supplies the peronei longus and brevis, and divides into the external cutaneous and anterior tibial nerves. The former supplies the skin of the upper surface of the foot and of all the toes except the outer side of the little toe and adjacent sides of the great and second toes. The anterior tibial supplies the extensors of the toes, the tibialis anticus, and peroneus tertius, and ends as a cutaneous branch to the skin of the adjacent sides of the great and second toes.

The *sacrococcygeal plexus* is a small plexus formed by the fourth and fifth sacral and the coccygeal nerves. It sends communicating branches to the sacral and coccygeal ganglia of the sympathetic, cutaneous branches to the skin of the arms and coccygeal region, muscular branches to the external anal sphincter, the levator ani, and coccygeal muscles, and branches to the pelvic plexus of the sympathetic, whence they supply the rectum and bladder.

Peripheral Terminations of Spinal Nerves. The modes of terminations of these processes are extremely varied and complicated. The terminations are always free in the sense that, while possibly sometimes penetrating cells, they are never directly continuous with their protoplasm. The motor nerve fibres end in voluntary and involuntary muscle. On its way to a muscle a motor fibre, which, as noted before, is the axon of an anterior horn cell, may divide into several branches, a single cell thus innervating more than one muscle fibre. On reaching a voluntary muscle the bundle of nerve fibres breaks up to form a plexus in the connective tissue which surrounds the bundles of muscle fibres. From this plexus nerve fibres pass to the individual muscle fibres. Having arrived at the muscle fibre in which it terminates, the nerve loses its medullary sheath, and its neurilemma fuses with the sarcolemma. The naked axon then penetrates the sarcolemma and terminates in a more or less elaborate expansion known as a motor end plate.

The sensory or afferent part of the spinal nerves is made by the peripheral processes of the spinal ganglion cells. In the skin and in those mucous membranes which are covered with squamous epithelium, the nerve fibres lose their medullary sheaths in the subepithelial tissue and, penetrating the epithelial layer, split up into minute fibrils which pass in between the cells and terminate there, often in little knob-like swellings. In addition to such comparatively simple nerve endings, there are also found in the skin and mucous membranes, especially where sensation is most acute, much more elaborate terminations. Among these may be mentioned Merkel's *tastzellen*, or touch cells, the tactile corpuscles of Meissner, and the Pacinian bodies. In tendons and in muscle, sensory nerve fibres, after losing their medullary sheaths, divide into minute fibrils which are often studded with irregular expansions. In gland tissue nerve fibres usually end as fine fibrils, which pass to the epithelial cells.

Physiology of the Spinal Cord and Spinal Nerves. The sensory nerve endings serve as the receptive apparatus by means of which external stimuli may induce a nervous impulse. The motor nerve endings serve as organs of distribution through which an impulse may so affect a muscle as to cause a contraction and consequent muscular action. The nerves themselves apparently serve merely as a conductive apparatus for transmitting the sensory impulses from the periphery to the spinal cord and the motor impulses from the cord to the muscles. The spinal cord must be considered as subserving several quite different though related physiological purposes, of which the following are the most important: 1. Its gray matter acts as a reflex centre, i.e., a centre in which an impulse brought to it by the fibres of the posterior nerve root (usually a sensory impulse) can determine an impulse passing out in the fibres of an anterior nerve root (usually a motor impulse). In this way a motion is produced by an external stimulus without any involvement of consciousness. A simple reflex is one in which the impulse passes directly from the posterior root fibres to the cells of the anterior horns. A compound reflex is one in which the impulse in passing from the posterior root fibre to the anterior horn cell passes through another neuron situated within the cord. 2. An automatic centre. By an automatic action is meant one which apparently occurs without any determining external stimulus, e.g., the rhythmical action of the heart or the contraction and expansion of the arteries. 3. A relay station in the transmission of impulses from and to the higher centres. This takes place through the fibre tracts of the cord, and has been already referred to in connection with the description of those tracts. 4. A conduction path. This also has been noted in connection with the description of the fibre tracts of the cord.

THE BRAIN

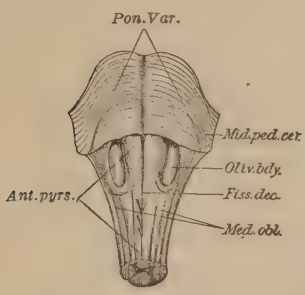
By this term is usually meant all that portion of the cerebrospinal axis contained in the cranial cavity.

The human brain is larger and heavier relatively to the size and weight of the body than the brain of any other animal, with the possible exception of some of the smallest birds and mammals. It is larger and heavier absolutely than that of any other animal except the elephant and larger whales. It is largest in the white races, smallest in some of the Central African savages. It is larger in the male than in the female. The average weight of the adult male brain of the white races of Europe and America has been estimated at from 49 to 50 ounces, of the female at from 43 to 45 ounces. The brain is much larger relatively to the size of the body in the infant than in the adult, the brain of the newborn child weighing on an average from 10 to 12 ounces. The brain increases in weight up to middle life. After 60 it usually decreases somewhat in weight. It is a common idea that large brains are apt to be associated with unusual intellectual development. Such is not, however, the case. While the brains of some men of great intellectual attainments have proved to be above the average in weight—Cuvier, 64 ounces; Abercrombie, 63 ounces; Goodsir, 57 ounces—the brains of other men apparently equally intellectual have not been above the average in weight, and Thurman reports a case of a male epileptic whose brain weighed 62 ounces, and Bicknill one from a similar case which weighed 64½ ounces. Brains weighing over 60 ounces have also been observed in the insane.

The brain may be subdivided into the medulla

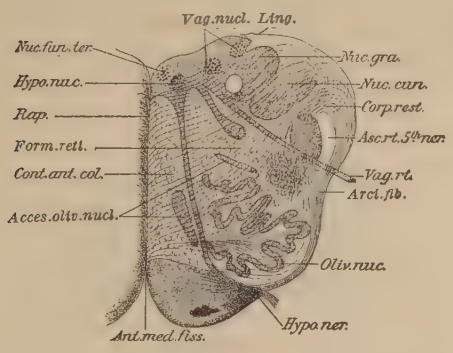
oblongata, the pons Varolii, the midbrain, the cerebellum, the basal ganglia, and the cerebral hemispheres.

The medulla oblongata is the continuation upward of the spinal cord and extends from the lower limit of the pyramidal decussation below to the lower margin of the pons above. The length of the medulla is about an inch, and its diameters, which at its lower portion correspond to those of the cord, increase from below upward. Externally the medulla shows the continuation upward of the anterior and of the posterior fissures of the cord. These fissures become more shallow as they ascend, the posterior fissure disappearing at about the middle of the medulla, where the central canal opens into the fourth ventricle. On either side of the anterior fissure is a prominence caused by the anterior pyramid, and to the outer side of the pyramid the bulging of the olivary body may be seen. The anterolateral surface of the medulla is also marked by the exit of the sixth to the twelfth (inclusive) cranial nerves. The posterior surface shows two prominences on either side—one next the posterior fissure known as the clava, caused by the nucleus gracilis, or nucleus of the column of Goll; the other just to the outer side of the clava, due to the nucleus cuneatus, or nucleus of the column of Burdach. The internal structure of the medulla shows considerable resemblance to that of the cord. This is especially true of the lower part of the medulla, the structures of which are directly continuous with those of the cord. The fibre tracts of the cord, however, assume, in the medulla, new directions, and in doing so break up the formation of the gray matter. This, together with the appearance of some new masses of gray matter and some new fibre bundles, is the main factor in determining the difference in structure between cord and medulla. The internal structure of the medulla can be best understood by tracing into it the structures of the spinal cord. At the junction of medulla and cord occurs the pyramidal decussation. Above this decussation the fibres of the main corticospinal motor tracts lie in two large bundles, one on either side of the anterior median fissure, known as the anterior pyramids. In the decussation of the pyramids the majority of these fibres cross over to the opposite posterolateral region and pass down into the cord as the crossed pyramidal tract, the few fibres remaining next the anterior fissure forming the direct pyramidal tract. The crossing fibres of the decussation separate off the anterior horns from the rest of the gray matter, while the intermingling of white matter and gray matter is known as the formatio reticularis. Shortly above the pyramidal decussation masses of gray matter begin to appear in the posterior columns. These are known respectively as the nucleus gracilis, or nucleus of the column of Goll, and the nucleus cuneatus, or nucleus of the column of Burdach. In these nuclei terminate most or all of the fibres of the columns of Goll and of Burdach. The nuclei increase in size *pari passu* with the decrease in the size of the columns, the latter finally entirely disappearing. These nuclei are therefore nuclei of termination for the fibres of these columns, and are of the nature of a relay station in the main spinocortical sensory conduction path. From cells in these nuclei axons pass around the central canal—internal arcuate fibres—decussate in the median line—sensory decussation—and then turn upward as the fillet or lemniscus. This is the main continuation brainward of the great sensory tract. Some axons from cells in the nuclei do not turn upward in the fillet, but, skirting the ventral surface of the pyramids, as the external arcuate fibres, pass to the cerebellum in the restiform body. Of the lateral tracts of the cord, the direct cerebellar tract joins the restiform body and thus reaches the cerebellum through its inferior peduncle, while the tract of Gowers continues upward in the lateral region of the medulla. The posterior horns become, in the medulla, separated from the rest of the gray matter and, becoming broken up, serve as nuclei of termination for the sensory divisions of some of the cranial nerves. As it passes up through the medulla, the central canal, surrounded by an increased amount of gelatinous substance, gradually approaches the posterior surface, to open at about the middle of the medulla into the fourth ventricle. Of the new masses of gray matter which appear in the medulla, the largest are the olivary nuclei. These are irregular convoluted masses of gray matter situated in the ventral part of the medulla behind and to the outer side of the pyramids. They extend from the upper limit of the sensory decussation to the pons. Each olivary nucleus has a central core of white fibres which cross the median line and pass to the opposite restiform body, forming the cerebello-olivary tract. To the inner side of the lower part of the olivary nucleus is a smaller mass of gray matter known as the accessory



MEDULLA OBLONGATA AND PONS VAROLII.

Pon. Var., pons Varolii; *Mid. ped. cer.*, middle peduncle of cerebellum; *Oliv. bdy.*, olivary body; *Fiss. dec.*, pyramidal decussation; *Med. obl.*, medulla oblongata; *Ant. pyrs.*, anterior pyramids.



SECTION OF THE MEDULLA OBLONGATA AT ABOUT THE MIDDLE OF THE OLIVARY BODY.

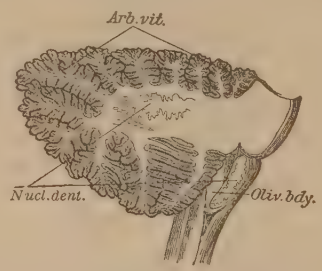
Nuc. fun. ter., nucleus of funiculus teres; *Vag. nucl.*, vagus nuclei; *Ling.*, lingula; *Nuc. gra.*, nucleus gracilis; *Nuc. cun.*, nucleus cuneatus; *Corp. rest.*, corpus restiforme; *Asc. rt. 5th ner.*, ascending root of 5th nerve; *Vag. rt.*, vagus root; *Arci. fib.*, arciform fibres; *Oliv. nuc.*, olivary nucleus; *Hypo. ner.*, hypoglossal nerve; *Ant. med. fiss.*, anterior median fissure; *Hypo. nuc.*, hypoglossal nucleus; *Rap.*, median raphe; *Form. reti.*, formatio reticularis; *Cont. ant. col.*, continuation of the anterior column; *Acces. oliv. nucl.*, accessory olivary nuclei.

olivary nucleus, while above the main mass of the olive is the superior olivary nucleus. The distinct line of decussating fibres which extends through the centre of medulla and pons is called the median raphe. The nuclei of certain of the cranial nerves form masses of gray matter in the medulla. These, together with the root fibres of the nerves, will be found described below in connection with the cranial nerves.

The pons Varolii, or bridge, lies just above the medulla. Superficially its ventral surface is composed of fibres which pass transversely, forming a sort of bridge between the two cerebellar hemispheres. Internally the pons is composed of tracts of fibres (white matter) and of nuclei (masses of gray matter). The fibre tracts pass both longitudinally and transversely. The longitudinal fibres are mainly the continuation upward of tracts already mentioned in the description of the medulla, the pyramidal tract or main motor tract and the fillet or main sensory tract. Some of the longitudinal fibres are, however, fibres connecting the nuclei pontis with higher centres and commissural fibres between the nuclei pontis. The transverse fibres of the pons mostly connect the cerebellum with the nuclei pontis, and are consequently often called the middle cerebellar peduncles. They are composed of two sets of fibres which decussate in the median line, forming a median raphe continuous with that of the medulla. Fibres of the roots of the fifth and some of the higher fibres of the roots of the sixth and seventh nerves pass from their nuclei of origin to the ventrolateral surface of the pons. The gray matter of the pons consists of the nuclei of the nerves just mentioned and of nuclei scattered throughout the pons, which are known as the nuclei pontis and are connected with the middle cerebellar peduncles and with the cerebrum. Near the posterior surface of the pons is the fourth ventricle, in the floor of which is a group of deeply pigmented nerve cells called the locus cæruleus.

Above the pons is the midbrain. Here the long fibre tracts are collected into two main bundles known as the cerebral peduncles or crura cerebri. Each peduncle, or crus, consists of a ventral portion or crusta, a dorsal portion or tegmentum, and, between these, a mass of gray matter, the substantia nigra. The dorsal part of the cerebral peduncle, or tegmentum, represents the continuation brainward of the main sensory tract to the cortex cerebri. Of the ventral part of the peduncles, or crustæ, about the middle three-fifths are taken up by the fibres of the pyramidal system (including fibres to the motor nuclei of the cranial nerves). Medial to these are the fibres which pass from the frontal lobe to the nuclei pontis, while external to the pyramidal fibres are the fibres connecting the temporal lobe with the nuclei pontis. As the peduncles approach the basal ganglia, the substantia nigra disappears and the tegmentum lies just dorsal to the crusta. These bundles of fibres pass through the basal ganglia between the nucleus caudatus and the optic thalamus on the mesial side and the nucleus lenticularis on the lateral side. Here they form the internal capsule, which is directly continuous above with the corona radiata, through which the fibres enter the cortex cerebri. A bend divides the capsule into an anterior and a posterior portion. The anterior portion lies between the caudate nucleus internally and the lenticular nucleus externally. This part of the capsule consists mainly of fibres which connect the cortex cerebri and the optic thalamus. The posterior portion of the internal capsule lies between the lenticular nucleus on its outer side and the optic thalamus on its inner side. About the anterior two-thirds of this portion is occupied by the fibres of the pyramidal tracts (including descending fibres to the motor cranial nerve nuclei). The corticopontal fibres connecting the cortex cerebri with the nuclei pontis pass through the internal capsule in two separate bundles: one bundle, coming from the frontal lobe, passes down in front of the main motor tract; the other bundle, coming from the temporal lobe, passes through the posterior portion of the internal capsule just behind the pyramidal tract. Through the posterior part of the internal capsule also passes the continuation upward of the tegmentum or main sensory tract to the cortex. On the posterior surface of the midbrain are the corpora quadrigemina or optic lobes. In the midbrain the fourth ventricle becomes narrowed and is known as the iter or aqueduct of Sylvius.

The *cerebellum*, or little brain, is that part which lies in the inferior occipital fossa. It is situated beneath the occipital lobes of the cerebrum, from which it is separated by the tentorium cerebelli. The average weight of the cerebellum is about 5½ ounces. Its size relative to that of the cerebrum is about 1 to 8. In the infant the cerebellum is relatively much smaller than in the adult, its weight being about one-twentieth that of the cerebrum. The cerebellum measures from 3½ to 4 inches in transverse diameter and about 2 inches from front to back at its centre. It consists of two lateral lobes and a smaller central lobe called the vermis. The cerebellum is connected with other parts of the nervous system by means of bundles of fibres known as peduncles. The superior peduncles connect it with the cerebrum, the inferior with the spinal cord. The middle peduncles connect it with the pons. The hemispheres of the cerebellum are separated in front by a fossa which encircles the corpora quadrigemina. Posteriorly the furrow is deeper and



VERTICAL SECTION OF THE CEREBELLUM.

Arb. vit., arbor vitæ; *Oliv. bdy.*, olivary body; *Nucl. dent.*, nucleus dentatus.

narrower. On the superior surface of the cerebellum, between the anterior and posterior furrows, the central lobe has a very slight elevation and is called the superior vermis. On the inferior surface of the cerebellum the central lobe, called the inferior vermis, lies at the bottom of the furrow, where it forms a distinct projection and is subdivided into an anterior portion, the nodule, a middle portion, the uvula, and a posterior portion, the pyramid. Two small lobes

stand out distinctly from the main bulk of the hemisphere—one, the flocculus, lying to the outer side of the nodule; the other, the tonsil, lying to the outer side of the uvula. Each hemisphere is divided transversely by a deep fissure called the great horizontal fissure, which separates it

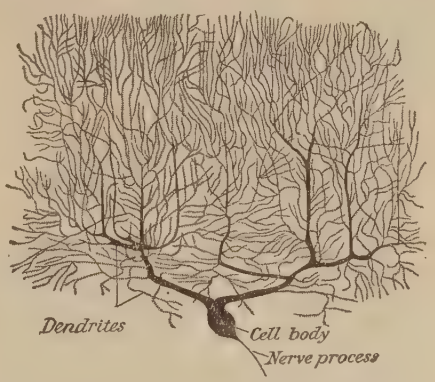
SCHEME OF THE CEREBELLAR CORTEX.

A, gray or molecular layer; *B*, granule layer; *C*, medulla or white matter; *a*, small granule cell; *b*, large granule cell; *c*, plexus of nerve fibres; *d*, horizontal bundle; *e*, fibres of molecular layer; *f*, cell of Purkinje; *g*, basket cell; *h*, small cortical cell; *i*, glia cell of the molecular layer; *k*, mossy cell resembling a glia cell; *l*, spider cell.

into an upper or tentorial surface and a lower or occipital surface. In addition to the flocculus and tonsil, the surface of the cerebellum is divided into several less distinct lobes. On the upper surface are the quadrangular lobe and the superior semilunar lobe; on the undersurface lie the biventral lobe, the slender lobe, and the inferior semilunar lobe. Besides the deeper furrows separating the lobes, the entire surface of the cerebellum is crossed by a multitude of transverse grooves which divide it into plates or lamellæ and give it a foliated or laminated appearance. On cutting into the cerebellum it is seen to consist of a core of white matter which branches out into the cortex, composed of a layer of gray matter, presenting the characteristic leaflike appearance known as the arbor vitæ. The white matter of the cerebellum is composed of medullated nerve fibres which are axons coming from cells situated in the cerebellum and passing out to terminate either in the cerebellum itself or in some other part of the nervous system, or coming from cells located in other parts of the nervous system to their terminations in the cerebellum. The gray matter is composed of three layers—an external or molecular, an internal or granular, and, between these, a layer of large cells, named after Purkinje. The molecular layer contains multipolar cells of various sizes, known as basket cells from the fact that, while their dendrites pass mostly towards the surface, their axons pass downward and end in a basket-like network around the cells of Purkinje. The granular or nuclear layer derives its name from the fact that after staining by the ordinary methods it appears to be composed of a mass of small closely packed cells, each cell consisting of a nucleus surrounded by an extremely small amount of protoplasm. Intermingled with these cells are medullated and nonmedullated fibres. By the application of the method of Golgi these cells have been divided into small granule cells (by far the more numerous) and large granule cells. In the case of the small granule cell the dendrites ramify in the granular layer, while the axon terminates freely in the molecular layer. The large granule cells, on the other hand, send their dendrites into the molecular layer, while their axons form a rich plexus within the granular layer. The dense network of fibres found in the granular layer is derived from the cells just described, from axons and collaterals of cells of Purkinje, and from fibres coming from the white matter.

Besides the gray matter of the cortex, certain independent masses of gray matter occur in the cerebellum. These are the nucleus dentatus, a convoluted body of gray matter situated to the inner side of the centre of the core of white matter, and the roof nuclei of Stilling, situated at the anterior end of the superior vermis and projecting forward into the roof of the ventricle.

The functions of the cerebellum have been made the subject of much discussion and investigation. It is itself insensible to irritation, and has been cut away in various animals without eliciting signs of pain; moreover, its removal or disorganization by disease is generally unaccompanied with loss or disorder of sensibility, animals from whom it has been removed being apparently able to smell, see, hear, and feel as perfectly as before. Flourens extirpated the cerebellum in birds by successive layers. Feebleness and want of harmony of the movements resulted from the removal of the superficial layers. When he reached the middle layers, the animals became restless; their movements were violent and irregular. By the time that the organ was entirely removed, the animals had completely lost the power of flying, walking, standing, and preserving their equilibrium.



NERVE CELL (CELL OF PURKINJE).

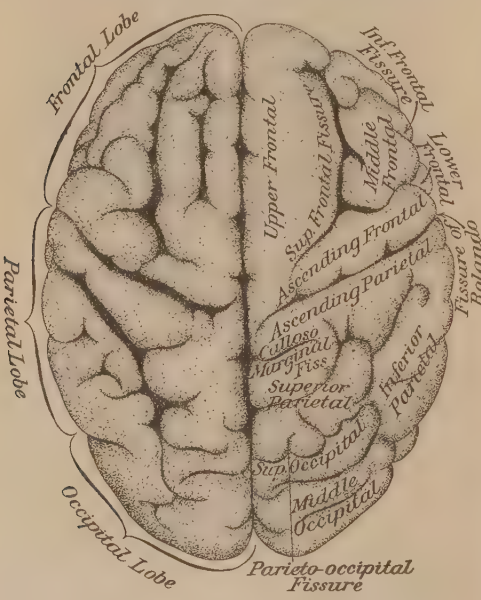
From a section through the human cerebellar cortex.

When a pigeon in this state was laid upon its back, it could not recover its former position, but fluttered its wings, and saw and tried to avoid a threatened blow. Hence volition, sensation, and memory were not lost, but merely the faculty of combining the actions of the muscles. From a large series of experiments of this kind, subsequently made on all classes of animals, Flourens inferred that the cerebellum belonged neither to the sensitive nor to the intellectual apparatus; that it was not the source of voluntary movements, although belonging to the motor apparatus; that it is the organ for the coördination of the voluntary movements or for the excitement of the combined and harmonious action of the muscles.

In spite of these facts, the extent to which muscular coördination is dependent upon the cerebellum cannot be considered as satisfactorily determined.

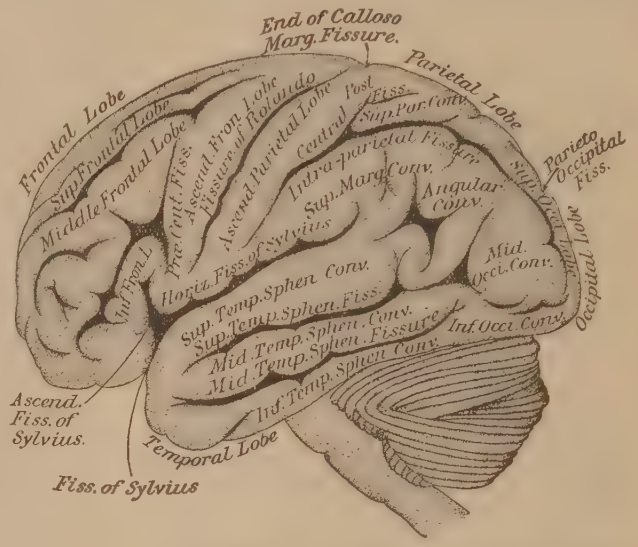
The *cerebrum*, or brain proper, constitutes in man the largest part of the cerebro-spinal axis. Lying within the cavity of the skull, its shape conforms to that of the cranial cavity. A deep fissure runs lengthwise of the brain, called the great longitudinal fissure, separating it into two equal hemispheres. At the bottom of the fissure a broad band of fibres—the corpus callosum—unites the two hemispheres. The surface of each hemisphere is marked by numerous elevations and depressions, the former known as convolutions or gyri, the latter as fissures or sulci. These convolutions serve to increase the actual surface of the brain without increasing the actual size of the organ, and the number and extent of the convolutions are in direct relation to the intellectual development, increasing throughout the ascent of the mammalian scale, and reaching their highest complexity in civilized man.

Fissures. Of the five principal fissures of the brain, two have already been mentioned—the great longitudinal fissure, separating the hemispheres, and the great transverse fissure, separating the cerebrum from the cerebellum. Each hemisphere presents three fissures which separate it into lobes. These are: 1. The fissure of Sylvius. This begins at the base of the brain (see diagram), passes upward and backward on the external surface of the hemisphere, and



UPPER SURFACE OF THE BRAIN, THE ARACHNOID HAVING BEEN REMOVED.

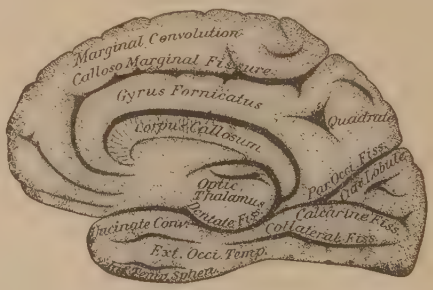
separates the frontal and parietal lobes from the temporal lobe. 2. The fissure of Rolando begins a little behind the mid-point of the great longitudinal fissure and extends downward and forward to a point somewhat above and behind the bifurcation of the Sylvian fissure. It separates the frontal lobe from the parietal lobe. 3. The parieto-occipital fissure begins about mid-



CONVOLUTIONS AND FISSURES OF THE OUTER SURFACE OF THE CEREBRAL HEMISPHERE.

way between the fissure of Rolando and the posterior extremity of the brain, sends a short branch outward, while its longer branch extends downward and forward on the inner surface of the hemisphere.

Lobes. The *frontal lobe* includes that part of the brain which lies in front of the fissure of Rolando and above the fissure of Sylvius. It presents the following convolutions: (*a*) the ascending frontal convolution, lying just in front of the fissure of Rolando and separated from the rest of the lobe by the vertical or pre-



CONVOLUTIONS AND FISSURES OF THE INNER SURFACE OF THE CEREBRAL HEMISPHERE.

central sulcus. This remaining portion of the frontal lobe is divided by two longitudinal sulci into (*b*) the superior frontal convolution, (*c*) the middle frontal convolution, and (*d*) the inferior frontal convolution, also known as the convolution of Broca. These convolutions extend more or less into the undersurface of the lobe, which is marked by a groove in which lies the olfactory bulb.

The *parietal lobe* is separated from the frontal lobe by the fissure of Rolando, from the temporal (temporosphenoidal) lobe below by the

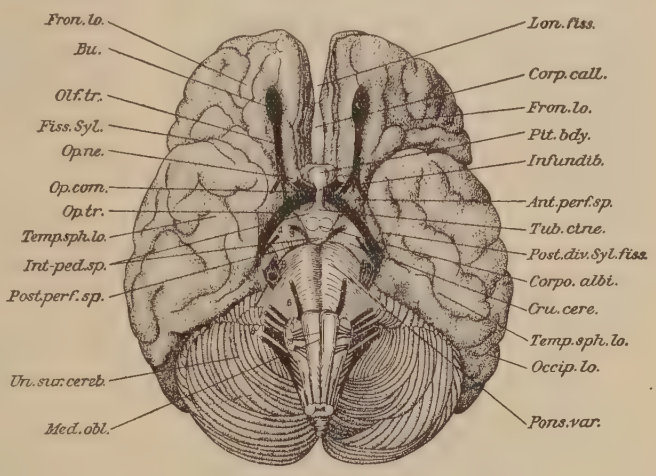
horizontal limb of the fissure of Sylvius, from the occipital lobe by the parieto-occipital fissure. It may be subdivided into four fairly well marked convolutions: (*a*) the ascending parietal, lying just behind the fissure of Rolando. Behind the ascending parietal convolution is the intraparietal sulcus. The portion of the parietal lobe above the horizontal part of the sulcus is known as (*b*) the superior-parietal convolution, and is continuous with the ascending parietal. That part of the lobe below the horizontal arm of the sulcus is divided by a vertical sulcus into (*c*) an anterior part, the supramarginal convolution, and (*d*) a posterior part, the angular convolution.

The *occipital lobe* is separated from the upper part of the parietal lobe by the parieto-occipital fissure, while it is more or less continuous with the lower part of the parietal lobe and with the temporal lobe by small connecting convolutions. The lobe is rather indefinitely divided by two small transverse fissures into first, second, and third occipital convolutions.

The *temporal lobe* lies in the middle fossa of the skull and is bounded above and in front by the Sylvian fissure. Posteriorly, connecting convolutions unite it with the parietal and occipital lobes. It is divided by two horizontal sulci into three convolutions called from above downward, the first, second, and third temporal convolutions.

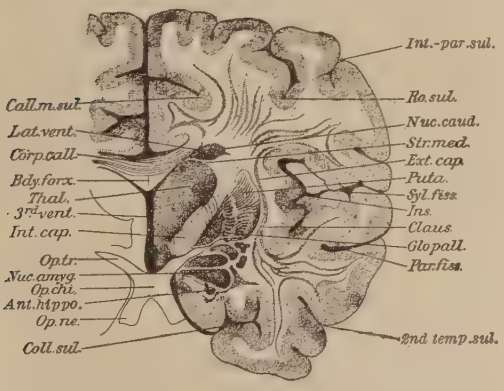
The *central lobe*, or *island of Reil*, is situated in the depth of the fissure of Sylvius, and is composed of five or six rather small convolutions.

The internal surface of the cerebrum is less distinctly marked off into lobes than the external. The fissures on the internal surface are the callosomarginal, the parieto-occipital, the calcarine, the collateral, and the dentate. The callosomarginal is the longest of these fissures, begins on the superior surface just behind the mid-point, and runs forward parallel to the curve of the surface of the brain, separating the marginal or first frontal convolution from the gyrus fornicatus, which lies just over the corpus callosum. The quadrate lobule lies between the callosomarginal sulcus and the parieto-occipital sulcus. The cuneus or occipital lobule lies between the parieto-occipital sulcus in front and above and the calcarine sulcus below. The uncinate gyrus lies below the Sylvian fissure and the dentate sulcus, while below it is separated from the temporal lobe by the collateral sulcus. The temporal lobe is continuous with that on the outer surface of the cerebrum. It presents two convolutions in addition to those already described on its outer surface.



BASE OF THE BRAIN.

Fron. lo., frontal lobe; *Bu.*, bulb; *Olf. tr.*, olfactory tract; *Fiss. Syl.*, fissure of Sylvius; *Op. ne.*, optic nerve; *Op. com.*, optic commissure; *Op. tr.*, optic tract; *Temp. sph. lo.*, temporosphenoidal lobe; *Int.-ped. sp.*, interpeduncular space; *Post. perf. sp.*, posterior perforated space; *Un. sur. cereb.*, undersurface of cerebellum; *Med. obl.*, medulla oblongata; *Lon. fiss.*, longitudinal fissure; *Corp. call.*, corpus callosum; *Pit. bdy.*, pituitary body; *Infundib.*, infundibulum; *Ant. perf. sp.*, anterior perforated space; *Tub. cine.*, tuber cinereum; *Post. div. Syl. fiss.*, posterior division of Sylvian fissure; *Corpo. albi.*, corpora albicantia; *Cru. cere.*, crura cerebri; *Temp. sph. lo.*, temporal (temporosphenoidal) lobe; *Occip. lo.*, occipital lobe; *Pons Var.*, pons Varolii.

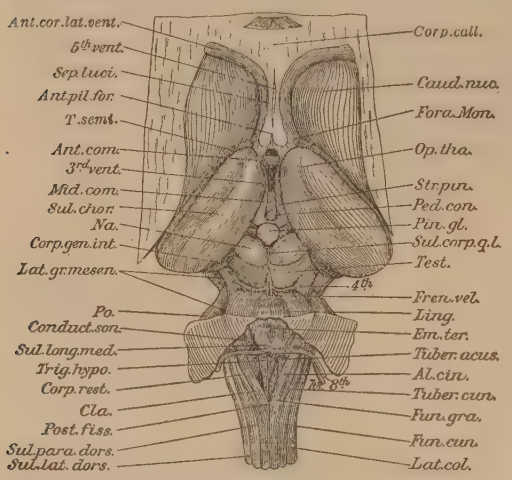


THE BRAIN VIEWED FROM BEHIND A FRONTAL SECTION THROUGH THE RIGHT HEMISPHERE TAKEN JUST BEHIND THE OPTIC CHIASMA.

Call. m. sul., callosomarginal sulcus; *Lat. vent.*, lateral ventricle; *Corp. call.*, corpus callosum; *Bdy. forx.*, body of fornix; *Thal.*, thalamus; *3rd vent.*, third ventricle; *Int. cap.*, internal capsule; *Op. tr.*, optic tract; *Nuc. amyg.*, nucleus amygdalæ; *Op. chi.*, optic chiasma; *Ant. hippo.*, anterior end of hippocampus major projecting into the descending cornu of the lateral ventricle; *Coll. sul.*, collateral sulcus; *Int.-par. sul.* intraparietal sulcus; *Ro. sul.*, Rolandic sulcus; *Nuc. caud.*, nucleus caudatus; *Str. med.*, stria medullaris; *Ext. cap.*, external capsule; *Puta.*, putamen; *Syl. fiss.*, Sylvian fissure; *Ins.*, insula; *Claus.*, claustrum; *Glo. pall.*, globus pallidus; *Par. fiss.*, parallel fissure; *2nd temp. sul.*, second temporal sulcus.

The undersurface of the cerebrum shows some important features, which, passing from before backward, are as follows: (1) The longitudinal fissure, separating the frontal lobes. (2) The corpus callosum, appearing in the depth of the longitudinal fissure and serving as a great transverse commissure connecting the two hemispheres. (3) The olfactory nerve with its expanded extremity the olfactory bulb, lying in a groove in the undersurface of the frontal lobe. (4) The fissure of Sylvius, separating the anterior from the middle lobe. (5) The anterior perforated space—so called from the perforations for the passage of blood vessels—is the undersurface of the corpus striatum. (See below.) (6) The pituitary body, or hypophysis cerebri. (7) The infundibulum is a narrow tube of gray matter connecting the pituitary body with (8) the tuber cinereum, an eminence of gray matter lying between the diverging cere-

bral peduncles. (9) The corpora albicantia, or corpora mamillaria, are two small white protuberances, each about the size of a pea, just behind the tuber cinereum. They are composed externally of white matter, internally of gray matter, and are formed by the anterior crura of the fornix. (10) The posterior perforated space lies between the corpora albicantia and the anterior fibres of the pons. Its perforations are due to vessels which pass to the optic thalami. (11) The optic commissure is the crossing of the right and the left optic tracts to form the optic nerves. It is situated just in front of the tuber cinereum. (See also below—optic nerve, under *Cranial Nerves.*) (12) The cerebral peduncles, or crura cerebri, are two diverging bundles of white fibres which appear to come out from behind the anterior border of the pons. (13) The undersurface of the cerebrum also shows the exit of the third and fourth cranial nerves.



METENCEPHALON, MESENCEPHALON, AND DIENCEPHALON FROM THE DORSAL SURFACE.

Ant. cor. lat. vent., anterior cornu of lateral ventricle; *5th vent.*, fifth ventricle; *Sep. luci.*, septum lucidum; *Ant. pil. for.*, anterior pillar of fornix; *T. semi.* (tænia semicircularis), stria terminalis; *Ant. com.*, anterior commissure; *3rd vent.*, third ventricle; *Mid. com.*, median commissure; *Sul. chor.*, sulcus choroideus; *Na.* (nates), colliculi superiores; *Corp. gen. int.*, corpus geniculatum internum; *Lat. gr. mesen.*, lateral groove of mesencephalon; *Po.*, pons; *Conduct. son.*, conductor sonorus; *Sul. long. med.*, sulcus longitudinalis medianus; *Trig. hypo.*, trigonum hypoglossi; *Corp. rest.*, corpus restiforme; *Cla.*, clava; *Post. fiss.*, posterior fissure; *Sul. para. dors.*, sulcus paramedianus dorsalis; *Sul. lat. dors.*, sulcus lateralis dorsalis; *Corp. call.*, corpus callosum; *Caud. nuc.*, caudate nucleus; *Fora. Mon.*, foramen of Monro; *Op. tha.*, optic thalamus; *Str. pin.* (stria pinealis), medullary stria; *Ped. con.*, pedunculus conarii; *Pin. gl.*, corpus pineale; *Sul. corp. q. l.*, sulcus corporum quadrigeminorum longitudinalis; *Test.* (testis), colliculus inferior; *Fren. vel.*, frenulus veli; *Ling.*, lingula; *Em. ter.*, eminentia teres; *Tuber. acus.*, tuberculum acusticum; *Al. cin.*, ala cinerea; *Tuber. cun.*, tuberculum cuneatum; *Fun. gra.*, funiculus gracilis (Goll's tract); *Fun. cun.*, funiculus cuneatus (Burdach's tract); *Lat. col.*, lateral column.

Ventricles of the Brain. The lateral ventricles represent the expanded anterior end of the embryonic neural canal, and are the cavities of the hemispheres. They are lined by a single layer of simple cylindrical epithelium, the ependyma, derived from the epiblastic lining of the neural canal. The two ventricles are separated from each other in the median line by a vertical septum known as the septum pellucidum. The shape of the ventricles is irregular, each ventricle consisting of a main cavity or body and extending off from this three smaller cavities called cornua or horns. The anterior horn passes outward and forward into the anterior lobe. The posterior horn extends backward into the posterior lobe, while the middle horn descends into the substance of the middle lobe. The main cavity of the ventricle is roofed in by the undersurface of the corpus callosum. Its floor is made by the corpus striatum and optic thalamus, although the stria terminalis, choroid plexus, corpus fimbriatum, and fornix are also situated in its floor. The third ventricle is a long narrow cavity lying between the optic thalami. Above it is bounded by the undersurface of the velum interpositum, to which is attached the choroid plexus of this ventricle. Its floor is made by the lamina cinerea, tuber cinereum, infundibulum, corpora albicantia, and posterior perforated space. Three commissures cross the cavity of the ventricle, known respectively as the anterior, the middle, and the posterior commissures. Four openings connect the third ventricle with other cavities. In front the foramina of Monro, one on each side, serve to connect the third ventricle with the lateral ventricles. Posteriorly, the aqueduct of Sylvius connects the third ventricle with the fourth. A fourth opening in the anterior part of the floor leads into the cavity of the infundibulum. The so-called fifth ventricle of the brain is, properly speaking, not a true ventricle, being simply a part of the great longitudinal fissure which has been cut off in the development of the brain, by the union of the two hemispheres, through the corpus callosum and the fornix. It is not lined by epithelium as are the other ventricles. The fourth ventricle is described in connection with the medulla oblongata.

Certain structures remain to be described which have already been mentioned as lying in the floor of the lateral ventricles. The two largest of these, often called the basal ganglia, are the corpora striata and the optic thalami.

The corpora striata are two masses of mingled gray matter and white matter, the superior surfaces of which appear in front of the body of the lateral ventricles. The extraventricular portion is known as the lentiform nucleus. The intraventricular part, known as the caudate nucleus, is smaller than the extraventricular, from which it is separated by the internal capsule, a large band of fibres which represents the continuation upward of the main tracts of the cord and crura on their way to the cerebrum. A layer of white matter which covers the extraventricular portion of the lentiform nucleus is known as the external capsule.

The optic thalamus lies to the inner side and behind the lentiform nucleus, from which it is separated by a part of the internal capsule. Each thalamus is composed of white matter externally, of gray matter internally, and rests upon the corresponding crus cerebri. In front is a prominence known as the anterior tubercle, while its posterior part presents two small rounded eminences, the internal and the external geniculate bodies.

The stria terminalis is a narrow band of white fibres which lies in the depression between the caudate nucleus and the optic thalamus. Anteriorly, it follows the descending pillar of the fornix; posteriorly, it passes into the descending horn of the ventricle, and at the bottom of the horn enters a mass of gray matter known as the nucleus amygdalæ.

The velum interpositum is a vascular extension of the pia mater into the interior of the brain through the great transverse fissure. It enters the third ventricle beneath the corpus callosum and above the optic thalami, corpora

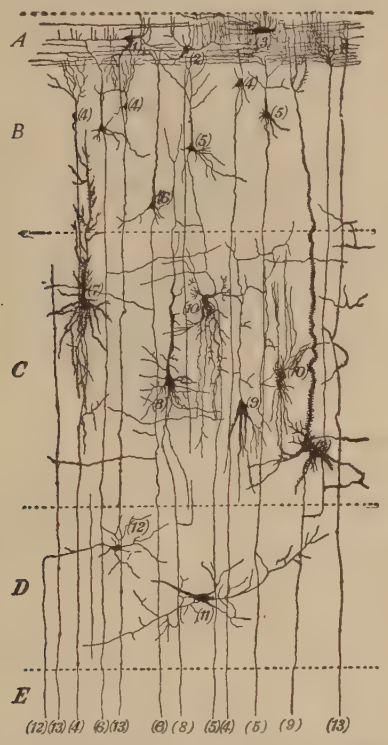


DIAGRAM OF THE CELLS OF THE CEREBRAL CORTEX.

A, superficial or molecular layer: (*1*) fusiform; (*2*) triangular; (*3*) polygonal cells of Cajal. *B*, layer of small pyramids: (*4*) smallest; (*5*) small; (*6*) medium-sized pyramidal cells with their axons descending to the white matter, giving off collaterals in their course. *C*, layer of large pyramidal cells: (*7*) large pyramidal cells with very numerous dendrites; (*8*) largest giant pyramidal cells; (*9*) Martinotti cell with descending dendrites and ascending axon; (*10*) polygonal cells. *D*, deep layer: (*11*) fusiform cells; (*12*) polygonal cells. *E*, the white matter containing axons from pyramidal cells, (*4*), (*5*), (*6*), (*8*), and cells (*12*) of the deep layer; (*13*) neuroglia fibre.

quadrigemina, and pineal body. Anteriorly, it bifurcates, a part entering each lateral ventricle through the foramen of Monro. In the third ventricle two vascular fringes hang down from the velum. These are the choroid plexuses of the third ventricle. In the lateral ventricles similar fringes are attached to the lateral margin of the velum. These are the choroid plexuses of the lateral ventricles.

The corpus fimbriatum, or fimbria hippocampi, is the lateral edge of the posterior pillar of the fornix. It is a narrow white band lying just behind the choroid plexus of the lateral ventricle.

The fornix is an arch-shaped band of white fibres, running longitudinally, which bifurcates both anteriorly and posteriorly, forming the anterior and the posterior pillars of the fornix. The central portion or body of the fornix is triangular in shape, its narrow anterior end being attached to the septum pellucidum, its broad posterior extremity being continuous with the corpus callosum. The anterior pillars curve downward in the lateral walls of the ventricle and enter the corpora albicantia, from which they pass into the optic thalami. The posterior pillars of the fornix pass downward in the descending horns of the lateral ventricle, their thin margin forming the already described corpora fimbriata.

The hippocampus major, or cornu Ammonis, so called from its fancied resemblance to a ram's horn, is a long curved body consisting of both gray matter and white matter which follows the curve of the floor of the middle horn of the lateral ventricle. It is formed by an extension inward of the dentate sulcus. The gray substance of the sulcus forms an irregular ridge along the margin of the hippocampus major, known as the fascia dentata. The lower end of the hippocampus major is marked by several rounded elevations which from their resemblance to the paw of an animal are known as the pes hippocampi. The hippocampus minor is a longitudinal eminence in the floor of the posterior horn of the lateral ventricle. It is due to the extension inward of the calcarine sulcus. The eminentia collateralis, or pes accessorius, is an eminence caused by the inward projection of the collateral fissure. It lies between the hippocampus major and hippocampus minor and between the posterior and descending horns of the lateral ventricle.

General Histology of the Cerebrum. Each cerebral convolution consists of a central white core covered by a layer of gray matter, which latter constitutes the cerebral cortex. The cerebral cortex may be divided into three fairly marked and distinct layers: (1) an outer barren or molecular layer; (2) a middle layer of pyramidal cells; (3) an inner layer of polymorphous cells.

1. The nerve cells of the barren or molecular layer are known as the cells of Cajal. They are fusiform, triangular, or irregular in shape, and both their dendrites and axons ramify in this outer layer, the axons passing mainly in a direction parallel to the surface. This layer also contains the terminations of the apical dendrites of the pyramidal cells, some medullated nerve fibres running parallel to the surface, called superficial tangential fibres, and a rich plexus of neuroglia.

2. The layer of pyramidal cells is often described as two separate layers, an outer layer of small pyramidal cells and a deeper layer of large pyramidal cells. Each pyramidal cell projects from its outward angle a large apical or main dendrite. Smaller dendrites pass off from the sides and base of the cell. The axon originates from the base of the cell and enters the white matter of the corona radiata. During its passage through the gray matter it sends off collateral branches, some of which are medullated and form the deep tangential fibres. Among the deeper cells of this layer are found some very large pyramidal cells, called the cells of Betz. These are found only in the motor cortex, and it is believed that their axons pass down through the internal capsule to the cord as the main motor tract. In this layer are also found cells —cells of Martinotti—the dendrites of which

PYRAMIDAL CELL FROM A PERPENDICULAR SECTION OF THE CEREBRAL CORTEX OF ADULT MAN.

The terminal branches of the dendrites running towards the molecular layer are not visible.

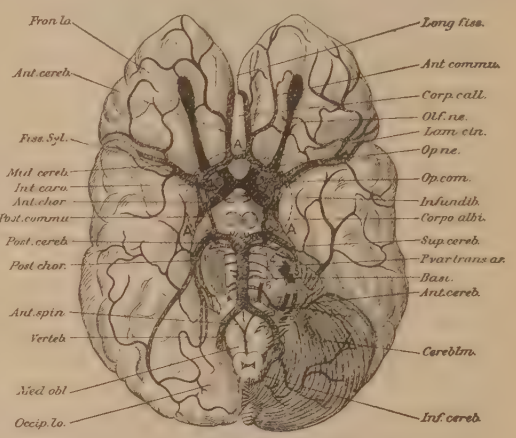
pass downward, while their axons pass upward to the molecular layer, where they turn and run parallel to the surface as the superficial tangential fibres. Cells of Golgi type II are also found in this layer. The axons of these cells branch rapidly and end in the gray matter in the vicinity of their cells of origin. The fibres of this layer consist of the axons and dendrites of the cells which have been described and of axons from cells in other regions which are passing to their terminations here.

3. The cells of the third layer are fusiform or irregular in shape. They have no apical dendrites, their protoplasmic processes coming off irregularly and ramifying mainly in this layer. Their axons pass down into the corona radiata. The fibres of this layer consist of axons and dendrites of the cells just described, of the axons of pyramidal cells, and of axons of cells in other parts of the nervous system which are passing to their terminations here.

The corona radiata, or central core of white matter radiating out into the gray matter, consists of: (1) Descending fibres, which are axons of the large and small pyramidal cells and of the polygonal cells of the third layer. These axons become medullated and pass (*a*) to other convolutions of the same hemisphere—association fibres; (*b*) through the corpus callosum to the opposite hemisphere—commissural fibres; (*c*) to the internal capsule as fibres of the descending tracts—projection fibres. (2) Ascending fibres, which are axons of cells situated elsewhere in the nervous system, and which are here passing to their terminations. These fibres are (*a*) axons of cells situated in other convolutions of the same hemisphere—association fibres; (*b*) axons of cells situated in the opposite hemisphere, which have come through the corpus callosum—commissural fibres; (*c*) axons which have come through the internal capsule from cells situated in lower centres—projection fibres.

Circulation. The arterial supply of the brain comes from two sources, the internal carotids and the vertebrals. At the base of the brain these four vessels form a remarkable anastomosis known as the circle of Willis. The arrangement of these vessels can be best appreciated by reference to the accompanying diagram. From this circle there pass off to the brain three main sets of branches: (1) The anterior cerebral arteries, which pass forward in the great longitudinal fissure, curve around the anterior border of the corpus callosum, and, running backward on its upper surface, terminate by anastomosing with the posterior cerebral arteries. They supply the undersurfaces of the anterior lobes, part of the internal surfaces of the hemispheres, the corpus callosum, the third ventricle, and the anterior perforated space. Near their origin from the internal carotids, the two anterior cerebrals are united by a short thick trunk, the anterior communicating. (2) The middle cerebral or Sylvian arteries, which pass outward along the Sylvian fissures, within which each divides into three branches—an anterior to the anterior lobe, a posterior to the posterior lobe, and a median to the small lobe near the end of the fissure of Sylvius. (3) The posterior cerebral arteries, which, arising from the basilar, pass backward and outward on the undersurfaces of the occipital lobes, each terminating in three branches, which pass respectively to the uncinate gyrus, to the temporosphenoidal lobe, and to the lingual, lobule, cuneus, and occipital lobe.

All these arteries ramify in the pia, where they anastomose freely. From this anastomosis are given off small branches which enter the substance of the brain, the shorter ones breaking up into a capillary network in the gray matter, the longer ones passing to the white matter. After entering the brain substance, there is no further anastomosis, the arterial capillaries passing directly into venous capillaries without communicating with neighboring arteries.



THE ARTERIES OF THE BASE OF THE BRAIN AND SUPERFICIAL ORIGIN OF CRANIAL NERVES. (The right half of the cerebellum and pons Varolii have been removed.)

Fron. lo., frontal lobe; *Ant. cereb.*, anterior cerebral; *Fiss. Syl.*, fissure of Sylvius; *Mid. cereb.*, middle cerebral; *Int. caro.*, internal carotid; *Ant. chor.*, anterior choroid; *Post. commu.*, posterior communicating; *Post. cereb.*, posterior cerebellar; *Post. chor.*, posterior choroid: *Ant. spin.*, anterior spinal; *Verteb.*, vertebral; *Med. obl.*, medulla oblongata; *Occip. lo.*, occipital lobe; *Long. fiss.*, longitudinal fissure; *Ant. commu.*, anterior communicating; *Corp. call.*, corpus callosum; *Olf. ne.*, olfactory nerve (first); *Lam. cin.*, lamina cinerea; *Op. ne.*, optic nerve (second); *Op. com.*, optic commissure; *Infundib.*, infundibulum; *Corpo. albi.*, corpora albicantia; *Sup. cereb.*, superior cerebellar; *P. Var. trans. ar.*, pons Varolii transverse arteries; *Basi.*, basilar; *Ant. cereb.*, anterior cerebellar; *Cereblm.*, cerebellum; *Inf. cereb.*, inferior cerebellar; *A.*, circle of Willis; *3*, oculomotor nerve (third); *4*, trochlear nerve (fourth); *5*, trigeminal or trifacial nerve (fifth); *6*, abducent nerve (sixth); 7, facial nerve (seventh); *8*, acoustic nerve (eighth); *9*, glossopharyngeal nerve (ninth).

Besides these cortical branches, branches from the circle of Willis supply the basal ganglia. Like those in the cortex, these arteries are terminal vessels.

The blood supply of the spinal cord is derived from three main arteries, the anterior spinal and two posterior spinal. The anterior spinal vessels arise from the vertebrals, and on the anterior surface of the medulla, unite to form a single trunk, which descends along the anterior median fissure. The posterior spinal arteries also arise from the vertebral arteries and pass down the posterior aspect of the cord along the line of the posterior nerve roots. Branches from the spinal arteries form an extensive anastomosis in the pia mater, and from this network branches pass into the substance of the cord. These arteries, like those in the brain, do not anastomose after entering the nervous tissue proper.

Functions of the Cerebrum. The brain, and more especially the cerebral hemispheres, must be considered as the organ of the mind. It is here that those material activities take place

which underlie those mental attributes which we recognize as consciousness, intellect, emotions, and will. In the case of the higher animals removal of the cerebrum results so promptly in death that few conclusions can be drawn. In one of the lower animals, e.g., the frog, the result is the destruction of all volition and apparently of all consciousness. Stimulation, such as pinching the toes or applying the electric current to nerves or muscles, causes muscular contraction and consequent movement, but if left entirely alone the frog shows no sign of movement, with the exception of the automatic movements connected with the heart beat and with breathing. Dalton's description of a pigeon from which the cerebrum had been removed is as follows: "The effect of this mutilation is simply to plunge the animal into a state of profound stupor in which it is almost entirely inattentive to surrounding objects. The bird remains sitting motionless upon his perch or standing upon the ground with eyes closed and head sunk between the shoulders. The plumage is smooth and glossy, but is uniformly expanded by a kind of erection of the feathers, so that the body appears somewhat puffed out and larger than natural. Occasionally the bird opens its eyes with a vacant stare, stretches its neck, perhaps shakes its bill once or twice, or smooths down the feathers upon its shoulders, and then relapses into its former apathetic condition." The brain would thus seem to be essential to any conscious activity. Whatever functions are carried on by the rest of the nervous system enter into consciousness only through the brain. Thus, stimulation of a sensory nerve may be conceived as causing a motion (as in the case of the frog without a cerebrum) entirely independent of the brain, but in such a case there is neither any consciousness of the stimulation (sensation) nor any knowledge or control of the resulting motion. It is a purely reflex act. By means of the brain, then, stimulation of sensory nerves results in an activity in consciousness which we call sensation, and by the same means both knowledge of and control over motion are accomplished. The so-called higher mental activities, intellect or thought and feeling or emotion, are also entirely dependent upon the cerebrum.

Our knowledge of the localization in the brain of its various functions is still far from perfect. Much of the experimentation upon cerebral localization has been done upon the monkey by exposing the brain and electrically stimulating its surface. The work of Ferrier along this line has been of extreme importance. By electrically stimulating the cortex in the monkey he determined the area stimulation of which caused motion of some part of the body, and by comparing the convolutions of the monkey's brain with those of the human brain, he determined the probably analogous areas. The results may be briefly summed up as follows: There is a considerable area having the fissure of Rolando for its central line, which is known as the general sensory-motor area. Stimulation of other parts of the brain failed to elicit any reaction. The sensory areas are not so well defined, and for obvious reasons are much more difficult of determination. Within this same region are probably located the areas which have to do with general sensations. The special senses have, however, special localizations. Thus, the cortical visual centre is situated in the occipital lobe, the centre for the conscious appreciation of sound (hearing centre) in the front and upper part of the temporal lobe, while the sense of smell is located below the latter in the tip of the temporal lobe.

That the frontal lobes are most concerned in the higher intellectual activities has long been believed. Stimulation of these lobes causes no reaction. According to Ferrier their complete removal causes no sensory or motor disturbances. Experimental removal of the frontal lobes in monkeys has no apparent effect on the appetites, instincts, sensory or voluntary movements, but there is a very decided alteration in the animal's character and behavior. Instead of being actively interested in their surroundings, and curiously prying into all that comes within the field of their observation, they remain apathetic or dull, or doze off to sleep, responding only to sensations or impressions of the moment, or varying their listlessness with purposeless wanderings to and fro. While not actually deprived of intelligence, they have lost the faculty of attentive and intelligent observation.

The separate localization of the different emotions, such as hate, love, fear, etc., which the teachings of phrenology would lead one to expect, has never been accomplished. In fact, there is every reason to believe that no such localization exists, the same parts of the cortex being concerned in very different emotions.

The Cranial Nerves. The cranial nerves arise from the undersurface of the brain and leave the cranial cavity through foramina in its floor. According to the older classification of Willis (1664) the cranial nerves were divided into nine pairs. The later and now more generally used classification of Sömmerring (1796) recognizes 12 pairs. The names of these nerves, taken in order from the frontal to the occipital part of the brain, are, according to these classifications, as follows:

NERVES	Sömmerring	Willis
	Pair	*Pair*
Olfactory	First	First
Optic	Second	Second
Oculomotor	Third	Third
Trochlear	Fourth	Fourth
Trigeminal	Fifth	Fifth
Abducens	Sixth	Sixth
Facial (Portio dura)	Seventh	Seventh
Acoustic (Portio mollis)	Eighth	
Glossopharyngeal	Ninth	Eighth
Vagus	Tenth	
Spinal accessory	Eleventh	Ninth
Hypoglossal	Twelfth	

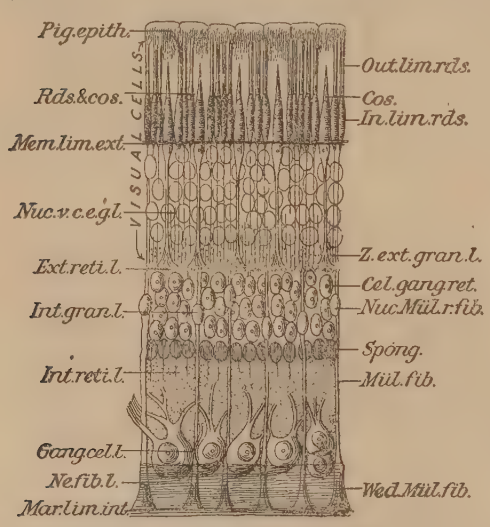
From the physiological standpoint these nerves fall into three groups, according to their functions. 1. Motor nerves: (*a*) oculomotor, (*b*) trochlear, (*c*) abducens, (*d*) facial, (*e*) hypoglossal. 2. Sensory nerves: (*a*) olfactory, (*b*) optic, (*c*) acoustic. 3. Mixed nerves: (*a*) trigeminal, (*b*) glossopharyngeal, (*c*) vagus, (*d*) spinal accessory. Of these the olfactory, optic, acoustic, and parts of the glossopharyngeal and trigeminal are sometimes classified by themselves as nerves of special sense.

The cranial nerves are connected with the surface of the brain at various points. These points are known as the apparent or superficial origin of the nerves. From these points their fibres can be traced into the substance of the brain to their real or deep origins in the gray matter.

The cranial nerves, with the exception of the first (olfactory) and the second (optic), are analogous, both embryologically and anatomically, to the spinal nerves.

The motor root fibres of the cranial nerves are the axons of neurons whose cell bodies are situated in the gray matter of the medulla and parts above (motor nuclei of the cranial nerves), just as the motor root fibres of the spinal nerves are the axons of neurons whose cell bodies are situated in the gray matter of the cord (anterior horns). These motor nuclei are the nuclei of origin for these nerves. They are nuclei of termination for neurons of higher systems which serve to bring the peripheral neuron under the control of higher centres.

The neurons which constitute the sensory portions of the cranial nerves have their cell bodies situated in ganglia outside the central nervous system. These ganglia correspond to the posterior root ganglia of the spinal nerves. The outwardly directed processes of these cells pass to their peripheral terminations, as do those of the spinal ganglia cells. The central axons of these neurons enter the medulla and form longitudinal tracts of fibres in a manner quite analogous to the formation of the posterior columns by the central axons of the spinal ganglia cells. The sensory root fibres of the cranial nerves, however, do not ascend, as do those of the spinal nerves, but turn spineward, forming descending roots. These fibres terminate in the gray matter of the medulla (terminal nuclei of the cranial nerves) in the



TRANSVERSE SECTION THROUGH THE RETINA OF MAN.

Pig. epith., pigment epithelium; *Rds. & cos.*, rods and cones; *Mem. lim. ext.*, membrana limitans externa; *Nuc. v. c. e. g. l.*, nuclei of visual cells (external granular layer); *Ext. reti. l.*, external reticular layer; *Int. gran. l.*, internal granular layer; *Int. reti. l.*, internal reticular layer; *Gang. cel. l.*, ganglion cells layer; *Ne. fib. l.*, nerve fibres layer; *Mar. lim. int.*, margo limitans internus; *Out. lim. rds.*, outer limbs of rods; *Cos.*, cones; *In. lim. rds.*, inner limbs of rods; *Z. ext. gran. l.*, zone of external granular layer, free from nuclei (*Henle's* external fibre layer); *Cel. gang. ret.*, cells of the ganglion retinæ; *Nuc. Mül. r. fib.*, nuclei of Müller's radial fibres; *Spong.*, spongiblasts; *Mül. fib.*, Müller's fibres; *Wed. Mül. fib.*, wedge of Müller's fibres.

same manner as do the spinal sensory root fibres in the gray matter of the cord and medulla.

The first, or olfactory, nerve is properly not a nerve, but a slender process of the brain which terminates in an enlargement, the olfactory bulb, from which the olfactory nerves themselves are given off. The size and development of this olfactory process and bulb vary greatly in different animals, being in man quite rudimentary

NERVES OF THE ORBIT, SEEN FROM ABOVE.

Sup. troch. ne., supratrochlear nerve; *Inf. troch. ne.*, infratrochlear nerve; *Sup. obl. m.*, superior oblique muscle; *Crib. pl. eth.*, cribriform plate of ethmoid; *Nas. ne*, nasal nerve; *Op. ne.*, optic nerve; *3rd ne.*, third nerve; *4th ne.*, fourth nerve; *Mot. rt.*, motor root; *Sens. rt.*, sensory root; *Sup. orb. ne.*, supraorbital nerve; *Lach. gl.*, lachrymal gland; *Elev. pal.*, elevator palpebræ; *Fron. ne.*, frontal nerve; *Lach. ne.*, lachrymal nerve; *Ext. rect. m.*, external rectus muscle; *Oph.*, ophthalmic; *Gasser. gang.*, Gasserian ganglion; *5th ne.*, fifth nerve; *Rec. fil. d. m.*, recurrent filament to dura mater.

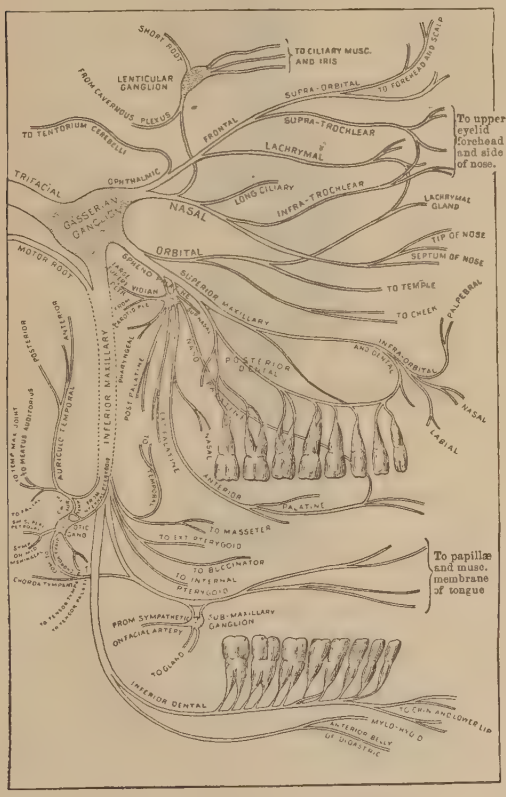
as compared with animals noted for their acute sense of smell. The olfactory nerves proper, i.e., the bundles of filaments extending from the undersurface of the olfactory bulb through the foramina in the cribriform plate of the ethmoid to the mucous membrane of the nose, are made up of axons of neurons whose cell bodies are located in the nasal mucous membrane. In this respect the peripheral olfactory neurons differ from all other human peripheral sensory neurons. The short, hairlike processes of these cells which pass outward towards the surface are the dendrites. The centrally directed processes are the axons. They are nonmedullated, and, passing through the cribriform plate in bundles (olfactory nerves), enter the olfactory bulb, where they terminate in end arborizations in the olfactory glomeruli. In the glomeruli they come into relation with the dendrites of the mitral cells of the olfactory lobe. The axons of these mitral cells are medullated and form the main mass of fibres which pass back to the brain through the olfactory process or tract and its roots.

The second cranial, or optic, nerve is the nerve concerned in the special sense of sight. It is distributed entirely to the eyeball. The nerves from the two eyes, passing backward and inward, unite to form the optic commissure. From the commissure two large bundles of fibres—the optic tracts—pass backward and outward to the brain. The eye differs from all other sense organs in that its nervous apparatus is developed by a direct outgrowth from the embryonic neural canal. Later the ingrowth of mesoblastic tissue separates the external or retinal part from the central nervous system. This retinal part is analogous to the

posterior root ganglion of the spinal nerves, and, as is the case with the latter, its subsequent connection with the central nervous system is made by the growth of axons from the peripherally situated cells back into the central system. For structure of retina, see EYE.

The third, or oculomotor, nerve is a purely motor nerve. Its fibres are the axons of a group of cells situated just to one side of the median line in the floor of the aqueduct of Sylvius beneath the corpora quadrigemina. Passing internally to the red nucleus, the nerve reaches the ventral surface of the midbrain at the inner margin of the cerebral peduncle in front of the pons. The nerve runs forward along the inner wall of the cavernous sinus and, dividing into two parts, enters the orbit through the sphenoidal fissure. Its superior branch supplies the superior rectus and levator palpebræ. The inferior branch supplies the internal rectus, the inferior rectus, and the inferior oblique.

The fourth, or trochlear (pathetic), is the smallest cranial nerve. Like the preceding, it is a purely motor nerve. Its fibres originate in a group of cells in the floor of the aqueduct of Sylvius, just below the nucleus of the third



PLAN OF THE FIFTH CRANIAL NERVE.

nerve. It winds around the outer side of the crus cerebri just in front of the pons and, passing along the outer wall of the cavernous sinus, enters the orbit through the sphenoidal fissure. It supplies the superior oblique muscle.

The fifth, trigeminus, or trifacial, is the largest of the cranial nerves. It resembles the spinal nerves in being composed of a motor part and a sensory part. The fibres of the smaller motor root come from cells situated in the medulla. The fibres of the sensory root come from cells in the Gasserian ganglion. The central processes of these cells enter the pons and pass to two nuclei in the floor of the fourth ventricle. The Gasserian ganglion lies in a depression in the petrous portion of the temporal bone. From the anterior aspect of the ganglion three branches are given off—the ophthalmic, the superior maxillary, and the inferior maxillary. The ophthalmic divides into three branches, the lachrymal, frontal, and nasal, which enter the orbit through the sphenoidal fissure and supply the eyeball, lachrymal gland, mucous membrane of the eye and nose, and the skin of the eyebrow, forehead, and nose. Connected with the ophthalmic branch is a small ganglion called the ophthalmic or ciliary ganglion. The superior maxillary is the middle of the branches of the Gasserian ganglion. It crosses the sphenomaxillary fossa, in which it gives off three branches, the orbital, the sphenopalatine, and the posterior dental. The nerve next enters the infraorbital canal, where it gives off the anterior dental branch. It then passes to the face through the infraorbital foramen and terminates in palpebral, nasal, and labial branches. The sphenopalatine, or Meckel's, ganglion is connected with this branch of the fifth nerve. It sends off four main sets of branches—ascending, to the orbit; descending, to the palate; posterior, to the pharynx; and internal, to the nose. The inferior maxillary is the largest branch of the Gasserian ganglion and receives the entire motor portion of the nerve. Just beneath the base of the skull the nerve divides into two branches, an anterior branch and a posterior branch. The anterior branch contains nearly all the motor fibres and, splitting up into masseteric, deep temporal, buccal, and pterygoid branches, supplies the muscles of mastication. The posterior division is mainly sensory and is distributed as three branches—the auriculo-temporal, gustatory, and inferior dental. Two small ganglia, the otic or Arnold's, and the submaxillary, are connected with this branch of the fifth nerve.

The sixth, or abducens, nerve is a small motor nerve which arises in the floor of the fourth ventricle and is distributed entirely to the lateral rectus muscle.

The seventh, or facial, is a motor nerve. It arises in a group of cells situated deep in the formatio reticularis of the upper part of the medulla. The nerve leaves the surface of the brain just behind the pons between the olive and the restiform body, thus lying to the outer side of the sixth nerve. It passes forward and enters the internal auditory meatus with the sixth nerve. At the bottom of the meatus it passes into the Fallopian aqueduct, by means of which it traverses the petrous portion of the temporal bone, finding exit through the stylomastoid foramen. It then enters the parotid gland, and just behind the jaw divides into two main branches, the temporofacial and cervicofacial. During its passage through the temporal bone it is connected with a small gray mass known as the geniculate ganglion. Its branches of distribution are as follows: Within the Fallopian aqueduct a tympanic branch to the stapedius muscle, and the chorda tympani to the muscle of the tongue (lingualis); at its exit from the styloid foramen, the posterior auricular branch to the retrahens aurem and part of

the occipito-frontalis, the stylohyoid to the muscle of that name, and the digastric to the digastric; on the face, the temporofacial, dividing into temporal branches and malar branches, and the cervicofacial, distributed to the muscles of the head and face.

The eighth, or acoustic (auditory), nerve is the nerve of hearing and is distributed to the internal ear. It is composed of two divisions, the cochlear and the vestibular. The fibres of the cochlear division are axons of bipolar cells in the ganglion of Corti. The peripheral processes of these cells end among the epithelial cells of Corti's organ within the cochlea. Their central processes enter the medulla at the junction of the medulla and pons and terminate in two nuclei known as the ventral and dorsal nuclei of the cochlear nerve. By means of neurons whose cell bodies are situated in these nuclei, auditory impressions are carried to higher centres. The neurons of the vestibular division of the nerve have their cell bodies located in Scarpa's ganglion or the ganglion vestibulare. These cells are bipolar and their peripheral processes end among the hair cells of the crista and macula acustica. Their central processes enter the medulla and pass to two nuclei of termination in which are cells whose axons carry the impulses to higher centres. See also EAR.

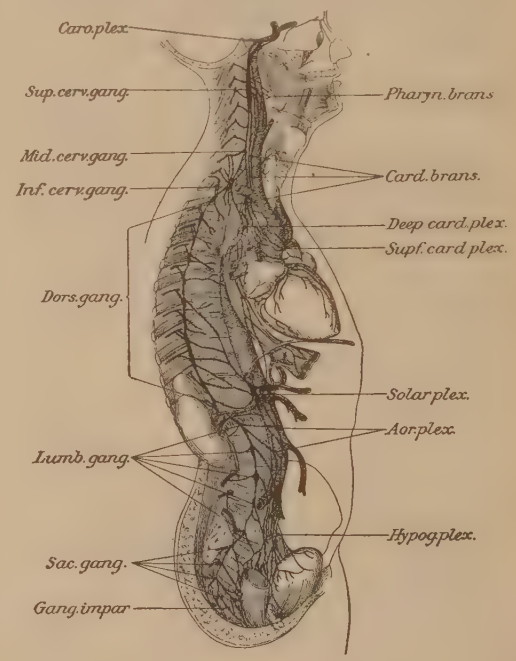
The ninth, or glossopharyngeal, nerve leaves the upper part of the medulla in the groove between the olive and the restiform body. It consists of a sensory part and a motor part. The nerve cells of the sensory part are situated in two small ganglia, the jugular and the petrous. The central processes of these cells enter the medulla and terminate in a nucleus in the floor of the fourth ventricle, which is common to this nerve and the tenth. The two parts of the nerve unite and leave the skull through the jugular foramen. Branches of this nerve are distributed to the tympanum, to the carotid, to the muscular coat and mucous membrane of the pharynx, to the stylopharyngeus, to the tonsil, and to the tongue.

The tenth, vagus, or pneumogastric nerve leaves the medulla just behind the ninth. It is composed of two portions, a sensory and a motor, which are connected with the already described nuclei common to both ninth and tenth nerves. The nerve leaves the cranial cavity through the jugular foramen. In the foramen it presents a swelling known as the ganglion jugulare, or ganglion of the root, while just outside the foramen is a second ganglion, the inferior ganglion, or ganglion of the trunk. It is in these two ganglia that the cell bodies of the sensory neurons of the nerve are situated. After its exit from the foramen, the nerve passes vertically down the neck within the sheath of the carotid vessels, supplying the larynx and œsophagus, heart and lungs, stomach, and most of the abdominal viscera.

The eleventh nerve, or accessory (spinal accessory), is composed of two parts, a spinal and a cerebral. The latter is the smaller and arises from a group of cells situated in the medulla below the nucleus of the vagus. It leaves the medulla as three or four small filaments and passes through the jugular foramen in a sheath common to it and the vagus, which it joins, supplying the cardio-inhibitory and visceromotor fibres of the vagus. The spinal portion of the nerve originates in a long nucleus situated in the lateral region and extending from the middle of the medulla to the fifth or sixth cervical nerve. The fibres leave the cord in the mid-lateral region and pass through the jugular foramen, supplying the sternomastoid and trapezius muscles.

The twelfth, or hypoglossal, nerve serves as the motor nerve for the tongue, whose muscles it supplies. Its nucleus is in the floor of the fourth ventricle, ventral and lateral to the central canal. Fibres from this nucleus leave the medulla in bundles, from 10 to 15 in number, between the olive and the anterior pyramids. The nerve passes through the anterior condyloid foramen. The branches of distribution are the descendens noni, the thyrohyoid muscular branches, and meningeal branches.

The Sympathetic Nervous System. This is composed of (*a*) two series of ganglia which are connected with one another by nerve fibres and extend along either side of the vertebral column from the base of the skull to the coccyx; (*b*) plexuses, three in number, which lie in front of the spine in the thoracic, abdominal, and pelvic cavities; (*c*) smaller ganglia, situated in



THE SYMPATHETIC NERVE.

Caro. plex., carotid plexus; *Sup. cerv. gang.*, superior cervical ganglion; *Mid. cerv. gang.*, middle cervical ganglion; *Inf. cerv. gang.*, inferior cervical ganglion; *Dors. gang.*, dorsal ganglia; *Lumb. gang.*, lumbar ganglia; *Sac. gang.*, sacral ganglia; *Gang. impar*, ganglion impar; *Pharyn. brans.*, pharyngeal branches; *Card. brans.*, cardiac branches; *Deep card. plex.*, deep cardiac plexus; *Supf. card. plex.*, superficial cardiac plexus; *Solar plex.*, solar plexus; *Aor. plex.*, aortic plexus; *Hypog. plex.*, hypogastric plexus.

or upon various viscera; (*d*) nerve fibres which connect the ganglia with one another, with the cerebrospinal system, and with the periphery.

The series of ganglia is known as the gangliated cord and may be subdivided into 3 cervical, 12 dorsal, 4 lumbar, and 5 sacral ganglia. In the neck these ganglia lie upon the transverse processes of the vertebræ, in the thorax upon the heads of the ribs, in the abdomen and pelvis upon the bodies of the vertebræ and upon the

sacrum. As the two cords pass into the pelvis they unite in a ganglion called the ganglion impar, in front of the coccyx. Superiorly the gangliated cord is continued into the sympathetic plexus on the carotid artery, this plexus being connected by filaments with the lower cranial nerves. The ganglia are connected with one another by bundles composed of intermingled gray fibres and white fibres, the white fibres being derived from the spinal nerves. The branches which connect the sympathetic ganglia with the cerebrospinal system are composed of both white fibres (medullated) and gray fibres (nonmedullated). The former are derived from the cerebrospinal axis and pass to the sympathetic; the latter originate in the sympathetic system and end in the cerebrospinal.

The three great gangliated plexuses are known respectively as the cardiac, the solar or cœliac, and the hypogastric. They are composed of nerve fibres and ganglia, the former coming from the cerebrospinal nerves and from the gangliated cord. The cardiac plexus consists of a superficial portion which lies in the concavity beneath the arch of the aorta, and of a deep portion situated between the aorta and the trachea. The solar plexus is the great plexus of the abdomen and supplies all the abdominal viscera. It is subdivided into several smaller plexuses, the names of which sufficiently indicate their location and distribution. They are known as the aortic plexus, the gastric plexus, the phrenic (diaphragmatic) plexus, the suprarenal plexus, the renal plexus, the spermatic (ovarian, in the female) plexus, the splenic plexus, the hepatic plexus, and the superior mesenteric plexus. The hypogastric plexus lies on the front of the sacrum between the two common iliac arteries. Below, the hypogastric plexus is continued into the pelvic plexus, which is situated at the side of the rectum and bladder in the male; of the rectum, vagina, and bladder in the female. It sends branches to all the pelvic viscera and gives rise to the following subsidiary plexuses: the inferior hemorrhoidal, the prostatic, the vesical, and in the female the uterine and vaginal.

Smaller ganglia are situated in certain viscera, notably in the heart, stomach, intestines, and uterus. They are mostly microscopical in size.

All of these ganglia serve as true nerve centres, and from them pass off branches of distribution to the involuntary muscles of the blood vessels and of the gastrointestinal canal, to the thoracic and abdominal viscera, to the secreting cells of the various glands, etc.

Functionally the sympathetic system is quite distinct from the cerebrospinal system. It has been called the system of vegetative existence because of its presiding over the processes of nutrition and growth, the so-called vegetative functions, in contradistinction to the cerebrospinal system, which presides over such distinctly animal faculties as sensation, motion, and intellect. The sympathetic system controls the so-called automatic mechanisms of the body, the rhythmical beating of the heart, contraction and dilatation of the arteries, the peristaltic action of the gastrointestinal tract, the contraction of smooth muscle in general wherever found, the control of secretion of various glands, etc. It has also been customary to ascribe to the sympathetic a certain trophic function, by which was meant the determination of the nutrition of the various tissues and organs. It seems more proper to ascribe this nutritional control to its vasomotor function, by means of which it determines the blood supply to the various parts. The sympathetic nerves contain both afferent and efferent fibres, so that impulses are transmitted both to and from the ganglionic centres. The close anatomical relation which exists between the cerebrospinal and the sympathetic system has been mentioned, and while the latter seems to be to a certain extent independent in its action, it is not infrequently brought under the control of the former even in our conscious activities. Thus, in the case of blushing an impulse reaching the cerebrospinal centres through the eye, ear, or other sense organs causes such a reaction on the part of the sympathetic as to bring about a dilation of the capillaries of the face. Again, in the case of the heart, quick beating and palpitation are frequently caused by the reaction of the sympathetic to impulses which have passed in through the cerebrospinal nerves.

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NES'BIT, Edith. See Bland, Edith Nesbit.

NESFIELD, nĕz'fēld, William Eden (1835–88). An English architect, born in Bath, the son of a well-known landscape architect, Maj. William Andrew Nesfield. He was educated at Eton and later apprenticed to the architect Burn and to his own uncle, who was a fanatical Gothicist. He traveled in France, Italy, and Greece and practiced in London after 1859. Nesfield designed a new wing to Combe Abbey, built Claverly Hall, Loughton Hall, and Kimmel Park, lodges for Regent's Park and Kew Gardens, a bank, hotel, and other buildings, and restored various churches. Although his *Sketches from France and Italy* (London, 1862) became almost a vade mecum for the Victorian Gothicists, he worked in both the Gothic and the Renaissance manners.

NESIOTES, nē'sī-ō'tēz. See Harmodius and Aristogiton.

NESPE'LIM. See Salishan Stock.

NESS, Loch. A lake in the County of Inverness, Scotland. It occupies, together with Loch Lochy and Loch Linnhe, the bottom of the great fracture, a rift valley of ancient age, which

in an almost straight line severs the northwestern Highlands from the rest of Scotland and which is known as Glen More, or Great Glen (Map: Scotland, D 2). Loch Ness is 23 miles long, from ½ to 1½ miles broad, and connected by the Ness River with Moray Firth on the northeast and the Caledonian Canal with Loch Lochy on the southwest. It receives the waters of several small rivers and is surrounded by high and steep mountains which make the scenery very picturesque. Owing to its immense depth, the Loch never freezes.

NESSELRODE, nĕs'sel-rō'de, KARL ROBERT, COUNT (1780–1862). A Russian diplomat, born at Lisbon, where his father then resided as Russian Ambassador. He devoted himself to a diplomatic career, won the confidence of the Emperor, Alexander I, and was in the diplomatic suite of the latter during the eventful year of 1813 and the negotiations at Paris after the first defeat of Napoleon. He was one of the signers of the treaty of the quadruple alliance at Chaumont and also of the treaty with Marshal Marmont for the surrender of Paris. He was one of the most prominent of the plenipotentiaries in the Congress of Vienna and in 1816 became Minister of Foreign Affairs and accompanied the Emperor Alexander to the congresses of Aix-la-Chapelle, Troppau, Laibach, and Verona, where he always advocated a policy of moderation. Under Nicholas I, Nesselrode became Vice Chancellor (1829) and Imperial Chancellor (1844). It fell to him to direct the Russian policy in the affairs of Greece and Turkey. Nesselrode was opposed to the policy which brought on the War of 1853–56 and retired from the Foreign Office after signing the Treaty of Paris in 1856, though he retained the dignity of Chancellor of the Empire and a seat in the Ministerial Council. He died at St. Petersburg, March 23, 1862. His autobiography, which is not of especial value, was published in 1866.

NESSLER, nĕs'lĕr, JULIUS (1827–1905). A German agricultural chemist, born at Kehl and educated at Freiburg, Strassburg, and Heidelberg. He established at Karlsruhe the important experiment station which afterward passed under government control. He retired in 1901. Among the preparations known by his name are Nessler's reagent for ammonia, a mixture of iodide of potassium and iodide of mercury with free potash, and Nessler's insect powder, powdered tobacco, fusel oil, soap, and spirits of wine. He described his important studies on the culture of the vine and of tobacco and on the tests of the purity of wine in *Der Wein, seine Bestandteile und seine Behandlung* (2d ed., 1866), *Der Tabak, seine Bestandteile und seine Behandlung* (1867), *Naturwissenschaftlicher Leitfaden für Landwirte und Gärtner* (3d ed., 1896), and *Die Bereitung, Pflege und Untersuchung des Weins* (7th ed., 1897).

NESSLER, VICTOR (1841–90). A German composer, born in Baldenheim, Alsace. He received his musical education in Leipzig, where he was a student of theology, during which period he successfully conducted several singing societies. The success of his opera *Fleurette* (1864) determined his career, and after further study in Leipzig he devoted himself entirely to composition. His works comprise half a score of operas and operettas of varying merit, the most successful of which, *Der Rattenfänger von Hameln* (1879), *Der wilde Jäger* (1881), and especially *Der Trompeter von Säkkingen* (1884), enjoyed immense popularity until the end of the last century. He also wrote choruses, song cycles, and part songs. He died at Strassburg.

NES'SUS (Lat., from Gk. *Νέσσος, Nessos*). In Greek mythology, a centaur who carried travelers over the river Evenus. When Hercules (q.v.) came with Deïanira (q.v.) to the river, he swam across, but allowed the centaur to carry Deïanira. Nessus offered violence to her and was killed by Hercules with an arrow that had been dipped in the poison of the Lernæan hydra (q.v.). In revenge Nessus told Deïanira that his blood would prove an invincible love philtre. Later, becoming jealous of Iole, she dipped a robe in the blood of Nessus and sent it to her husband, who was so tortured by the poisoned blood that he sought death on the funeral pile. Sophocles deals with this myth in the *Trachiniæ*.

NEST. A receptacle for eggs or young, provided by many sorts of animals. The nest reaches its greatest elaboration among birds, where in some cases, as that of the cotton bird, hangnests, weaver birds, etc., it becomes a fabric woven with astonishing ingenuity. The nests of certain swifts (see SALANGANE) are further remarkable for edible qualities. Nests and the habits, instincts, and utilities connected with them are fully discussed under NIDIFICATION.

NEST FUNGI. See BASIDIOMYCETES; NIDULARIALES; Plate of FUNGI, TYPES OF.

NES'TOR (Lat., from Gk. *Νέστωρ*). In the Homeric epic, the type of the wise and vigorous old man. He was said to be a son of Neleus (q.v.) and Chloris; he was not slain by Hercules because he was away at Gerenia. At the time of the Trojan War he had already outlived two generations. He is the persuasive speaker, drawing on his stores of wisdom and experience for the guidance of the younger leaders. On his return to Pylos he punished the neighboring Epeians of Elis for their raids. He even took part in the war between the Lapithæ and the Centaurs, but it is only in later writers that he appears as a participant in the Calydonian Hunt and the Argonautic expedition. His part in the *Iliad* is prominent; the Ionian princes of Asia Minor regarded themselves as his descendants. He appears in the *Odyssey* as safely returned from Troy to Pylos, where he hospitably receives the young Telemachus. Of his death there was no tradition, but Pausanias mentions his grave at Pylos.

NESTOR (1056–1114). The reputed author of the first Russian chronicle of a national character. In 1073 he entered the Petcherski convent at Kiev, where he died after a life of asceticism and holiness. He is reputed to have written the *Lives of Saint Boris and Glieb* and the *Life of Saint Theodosius*, whose relics he is known to have removed in 1091. Owing to some discrepancies between these *Lives* and the so-called Nestor's *Chronicle*, most critics have denied him the authorship of the latter. There is, indeed, no direct evidence of his authorship, and he certainly did not, if at all, write more than a small portion. A note after the year 1110 shows that the subsequent narrative belongs to another person. The original of the chronicle has not come down to us, nor is there any faithful copy of it extant. There are, however, some 170 manuscripts, the outcome of the successive efforts of several editors and continuers. The earliest codex is the *Laurentianus*, written in 1377, and the next the *Hypaticus*, named after

the Ipatievski monastery at Kostroma. Like the mediæval chronicles of Joannes Malalas and Georgios Hamartolos, on which it drew for much information in general history, Nestor's story begins with the distribution of mankind after the flood and then leads up to the Slavs—a branch of the Japhetic race—and their subdivisions. Nestor made use of all possible sources of information. The rapid growth of Kiev inspired the author to a high pitch of patriotism, the narrative often attaining great poetic fervor and charm. The best editions of the *Chronicle* have been published by the Russian Archæographical Commission at St. Petersburg in 1846 (*Polnoe Sobranie Russkikh Lětopiseĭ*, vols. i–ii) and 1871–72. Consult the notes of the different editors and translators of the *Chronicle:* Miklosich (Vienna, 1860; Latin); Bielowski (Lemberg, 1864; Polish); Erben (Prague, 1864; Czech); Léger (Paris, 1884; French); M. P. Pogodin, *Nestor*, translated into German by F. Löwe (St. Petersburg, 1844); K. N. Bestuzhev-Riumin, *Quellen und Literatur zur russischen Geschichte* (Ger. trans., Mitau, 1876); the authorities listed in Potthast, *Bibliotheca historica Medii Ævi*, vol. ii (2d ed., Berlin, 1896); *Proceedings of the Eleventh Archeological Meeting at Kiev*, vol. ii (Moscow, 1902); V. O. Klutchevski, *History of Russia*, vol. i (New York, 1911).

NESTO'RIAN MONUMENT. A stone slab dating from 781 A.D. and the only record yet discovered of the Nestorian movement in China. It was dug up in 1625 at Changan, a suburb of Singan-fu, one of the former capitals of China. The tablet is about 6¼ feet high and 3 feet wide, with a cross carved at the top, below which is a Chinese inscription consisting of 1789 characters, accompanied by further inscriptions in Syriac writing. The part in Syriac contains the date of erection, the names of the Patriarch of the Nestorian church, the Bishop of China (which was designated as *Tzinisthán*), and the names of 67 persons (with 61 in Chinese), most of whom are called priests. The Chinese inscription is in three parts: (1) an outline of Christianity; (2) the labors of the missionary Olopan, who arrived in China in 635, and the account of the church in China for about 150 years, until the erection of the stone in 781; (3) praises of the emperors who favored the religion. The monument was probably buried about 845, when the Emperor Wu-tsung issued his edict against Buddhism and Nestorianism. The first translation of the writings was published by the Jesuit Kircher in 1636, and many other versions have since been made. The stone has been denounced as a forgery by some, including Voltaire, but it is universally regarded to-day as genuine. In 1907 Mr. Frits v. Holm had an exact replica of the tablet made at Singan-fu of the same stone as the original, which he presented to the Metropolitan Museum in New York City. For very complete accounts, consult: Henry Yule, *Cathay and the Way Thither* (2 vols., London, 1866); Holm and Carus, *The Nestorian Monument* (Chicago, 1909); E. H. Parker, *Studies in Chinese Religion* (London, 1910).

NESTORIANS. The name commonly given to one of the schismatic churches of the East, formerly large and flourishing, but now small in numbers and with little influence. The name is derived from Nestorius (q.v.). It was first applied to them by a theological opponent, Philoxenus, Monophysite Bishop of Hierapolis, about the year 500 A.D., and although the Nestorians themselves never adopted the title, preferring to be known as Chaldæan or Oriental Christians, it passed into common use and has remained their usual designation. The Nestorians claim an apostolic origin for their church, appealing to an ancient tradition according to which the Apostle Thaddæus is said to have carried the Gospel to King Abgar of Edessa, but this story lacks historical confirmation. There is no clear evidence of the presence of Christianity in Persia before about 200, when the Bishop of Antioch held control over that section of the Church. Under the Neo-Persian Kingdom of the Sassanidæ (q.v.), in the third century, a new bishopric was established at Seleucia-Ctesiphon, on the Tigris, which in time assumed ecclesiastical leadership. But it was not until the fifth century that the Nestorians began to call the Bishop of Seleucia their Catholicus, or national patriarch, and it was still longer before his primacy was acknowledged by the other bishops. In 498 he assumed the title of Patriarch of the East.

The chief causes which gave rise to the separate existence of the Nestorian church during the fifth century were as follows: (1) the reorganization of the Church by a synod of 40 bishops, held in Ctesiphon in 410, after a severe persecution; (2) the condemnation of Nestorius in 431; (3) the expulsion of Nestorius' sympathizers from Edessa by Bishop Rabulas after the Council of Ephesus; (4) the rise of Nisibis as a centre of Christian learning and theological influence from 435 onward; and (5) the final closing of the school at Edessa by the Emperor Zeno in 489, on account of its persistent Nestorian leanings and the consequent spread of its teachings by the scattered teachers. All these things operated to separate Persian Christianity from organic connection with the see of Constantinople. The Nestorian leaders succeeded in winning favor with the Persian kings to such an extent as completely to control the ecclesiastical situation. They had been aided in the earlier stages of their growth by the prestige of adherents like Aphraates in the fourth century and Ibas, Bishop of Edessa, in the fifth; but their most important leader in the formative period was Barsumas, one of those whom Rabulas had driven out of Edessa in 431. Barsumas became Bishop of Nisibis, and for more than half a century (435–489) he guided the fortunes of the Persian church, wisely administering his see, winning royal favor, and establishing schools of learning (e.g., at Seleucia) to perpetuate the movement to which he had devoted his life.

During the sixth and seventh centuries the Nestorians greatly extended their numbers and influence, reaching out by means of missions into Arabia, Armenia, India, Tartary, Ceylon, and China. An ancient monument, discovered in the seventeenth century, bears testimony to the existence of Nestorian Christianity in China. (See NESTORIAN MONUMENT.) In 642, as a consequence of the Arab conquest of the Sassanid Kingdom, the Nestorians passed under Mohammedan rule; but the caliphs granted them a considerable degree of religious toleration, and their Catholicus was treated as if he were Patriarch of all the Asiatic Christians under Moslem rule. He took up his residence in Bagdad (in 762) and there remained as long as the caliphate endured. In Arabia also the Nestorians met with favor in the eyes of their Mo-

hammedan neighbors. This friendly treatment was possibly due in part to the example of Mohammed himself, who is said once to have come into friendly contact in Arabia with a Nestorian monk, named Sergius, from whom he may have gained some knowledge of Christianity and still more to the policy of fostering a division of the Christian Church which was not in accord with the Byzantine empire.

Nestorian Christianity culminated in the thirteenth century, when there were 25 metropolitans in the hierarchy, no one of whom had fewer than six bishops under his jurisdiction. The Catholicus was almost a pope in the extent of his ecclesiastical domain. But from this time onward their prosperity diminishes. After the fall of Bagdad before the Mongols (1258) the Catholicus was obliged frequently to change his residence, which was in itself a serious administrative disadvantage. In the fourteenth century came the Tatars, under the fierce Timur (q.v.), who made sad havoc of the Nestorians. Internal dissensions split the church in the sixteenth century, but those who claimed to be the true Nestorians adhered to the hereditary line of Mar Shimun, the family from which the Catholicus has been chosen ever since the fifteenth century. Their Patriarch always bears the name of Simeon (Shimun). Some ultimately joined the Roman Catholic church, admitting the supremacy of the Pope, but retaining special privileges, such as clerical marriage, which was a very ancient custom among them. These constitute the so-called Uniat Chaldæans. At present the Nestorians in Kurdistan and Persia number over 150,000, with 250 churches, 12 archbishops and bishops, and over 300 priests. The Chaldæans are estimated at over 100,000, with 150 churches and more than 250 priests. India has some 120,000 Nestorians and 200,000 Uniats.

The Nestorians take their stand upon the first two ecumenical councils, rejecting the decisions of Ephesus and of course taking no part in subsequent councils of the Catholic church. They have never accepted the supremacy of the Pope, nor the doctrine of transubstantiation, nor purgatory, nor the veneration of Mary, nor the use of images. Their hierarchical organization culminates in the patriarchate. They have sanctioned clerical marriage ever since the fifth century, although this privilege does not extend to the bishops. Ancient Syriac is the language of their liturgy. Their former generous philanthropy, exemplified in the foundation of asylums, almshouses, etc., has vanished along with their general prosperity as a church and people, and at present they are themselves the objects of charity and of missionary effort. Friendly negotiations have been carried on with them by representatives of the Church of England, partly in the hope of bringing about ecclesiastical union. An American Presbyterian mission at Urumiah has had success, especially in educational work. In 1898 the Persian branch of the Nestorian church formally joined the Orthodox church of Russia, thereby gaining the political protection of the Czar.

The Christians of St. Thomas, dwelling on the coast of Malabar, India, are historically connected with the Nestorians.

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NESTO'RIUS (Lat., from Gk. Νεστόριος, *Nestorios*). Bishop of Constantinople (428–431) and author of the Christological heresy known as Nestorianism. He was born in Syria Euphoratensis and was a pupil of Theodore of Mopsuestia, one of the leading theological teachers of Antioch, who was greatly revered throughout the Asiatic section of the Eastern Church.

In 428 Nestorius was summoned from his monastic retirement near Antioch to become Bishop of Constantinople, whither his fame as an ascetic and preacher had preceded him. As Patriarch, Nestorius immediately declared war upon all heretics and began persecutions against Arians, Quartodecimanians, Macedonians, etc. The popular theology of Constantinople did not escape. A presbyter named Anastasius, preaching in the cathedral church one day, declared with energy, "Let no man call Mary 'Mother of God,' for Mary was only a woman, and it is impossible that God should be born of a woman." Nestorius hastened to support and reiterate the position his presbyter had taken, which was an open defiance of the Alexandrian party.

A fierce controversy ensued. Cyril, Bishop of Alexandria, supported by Cœlestine, Bishop of Rome, published 12 anathemas against Nestorius, to which Nestorius replied in kind. The Emperor, Theodosius II, was obliged to convene a general council to settle the disturbance. It met at Ephesus in 431. (See EPHESUS, COUNCILS OF.) Its stormy proceedings were directed by Cyril, and Nestorius was condemned. John of Antioch, who arrived late, entered an unavailing protest against this verdict. The writings of Nestorius were burned by Imperial order, and his followers were branded with the opprobrious name of Simonians. Nestorius was allowed to return to his old monastery near Antioch, where he passed four years. He was then banished to Arabia and afterward to Egypt, where he endured many hardships and won the title of martyr among his followers. He wrote a defense of his life and teaching, of which only a few fragments survive (in the works of his opponents). We have a melancholy picture of the closing years of his life in Evagrius' *Ecclesiastical History*, i, 7, which is evidently colored by the author's hostility. The place and date of his death are unknown. The Nestorians (q.v.), although bearing his name, do not cherish his peculiar teaching. An illustration of Monophysite detestation of his memory is found in the grim ceremony of the Jacobites, who once a year assemble and cast stones upon the spot where his body is supposed to have been buried.

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NESUS. See CHINA, *Ethnology;* LOLOS.

NET. See NETS.

NETHER HOYLAND. See HOYLAND, NETHER.

NETH'ERLANDS, THE; often called HOLLAND. The country forming, with the coastal region of Belgium, the lowest part of Europe. It is the western continuation of the low plain of north Germany and lies between lat. 50° 45′ and 53° 30′ N. and long. 3° 22′ and 7° 12′ E. It is bounded on the west and north by the North Sea, on the east by Germany, and on the south by Belgium. With an area of only 12,648 square miles, exclusive of the Zuider Zee (q.v.) and the Dutch part of the Dollart (q.v.), it is one of the smallest independent states of Europe. A new province of 523,000 acres, to be created by the draining of a part of the Zuider Zee, is projected. The topography has had a leading part in shaping its history. It is nowhere more than 120 miles from the sea, which forms one-half (465 miles) of its boundaries.

Topography. The northern part of the Netherlands is indented by the Zuider Zee, which represents in part an ancient lake, the sea having broken through the intervening land in the thirteenth century. There are many considerable islands along the coast, distributed in two groups. Off the north coast are the Frisian Islands, comprising Texel, Vlieland, Ter Schelling, Ameland, and others. In the southwest are the numerous islands of the great Rhine-Meuse-Scheldt Delta, among which are Voorne, Overflakkee, Schouwen Tholen, North Beveland, South Beveland, and Walcheren. The country is the flattest part of the Continent, mainly a region of monotonous stretches of plains, interrupted only by sand dunes and some other undulations and low hills, particularly in the southeast. One-fourth of this region adjoining the sea front lies below the level of the sea, a considerable part of it in North and South Holland as much as 20 feet. Thirteen per cent lies between sea level and 3 feet above the sea. The mean height of the entire Kingdom is only 30 to 33 feet above the sea, while the culminating height is 1055 feet, in the extreme southeast of Limburg.

Three features, the dunes, dikes, and polders, characterize the north and south belt nearest to the sea. The dunes stretching along the coast were formed by the winds and sea, which heaped up the ocean sands into rows of hills from 20 to 60 feet apart and from 35 to 200 feet high. Wherever they front the coast they are adequate protection against the sea. These sand ridges and hills are sparsely wooded, but are saved from disintegration by natural or cultivated growths of plants. Few parts of them are tilled, but the sandy regions behind them are carefully cultivated. The dikes are gigantic artificial embankments of earth faced with stone or protected by stakes. They guard the country against the sea at the places where there are no dunes. The largest is the Helder Dike. (See HELDER.) There are also smaller dikes, as a precaution against floods, on the banks of the Rhine and other streams. Inside the line of dunes and dikes are great numbers of polders, which are areas of land inclosed by dikes that not only protect them from floods, but also render it possible to pump out the water from within the inclosure. The land thus won with enormous toil is exceedingly fertile and valuable.

The lands reclaimed from the sea along the coast and the basins of the rivers in the south are the most industrial and populous parts of the Netherlands. Here are the richest pastures, where most of the fine breeds of Dutch cattle are reared and the dairy industry thrives. Back of these lowest lands and polders the remaining 62 per cent of the surface forms a series of zones stretching from southwest to northeast. First, stretch low plains strewn with gravel and sand brought down from the north, with swellings of ground caused by deeper accumulations of this material; and in the east are many moors or bogs covered with moss and heather, many of which have been drained, the peat cut away for fuel, and the land reclaimed for cultivation. Then, along the east border, in Drenthe, Overijssel, Gelderland, North Brabant, and Limburg there are hills of gravel and sand ranging from 150 to over 300 feet in elevation.

Hydrography. The numerous bogs and marshes testify to the imperfect drainage. There are many small streams, but no large rivers except in the south. These large rivers flow in the direction of the general slope of the country from east to west. They are all international streams, important in the commerce of western Europe. The Rhine is the great highway between west Germany and the sea. Entering Holland, it divides into numerous arms, the chief of which are the Waal, the Lek, and the Yssel. Four-fifths of the river trade of Holland is carried on the Rhine and the Waal, making Rotterdam a Rhine harbor. The Meuse (Dutch *Maas*) joins the Waal, thus mingling its waters with those of the Rhine, and is important in the commerce of east Belgium. The Scheldt or Schelde, whose estuary is mainly in the Netherlands, carries ocean vessels to Antwerp, and small boats from the Netherlands ascend the river to the centre of Belgium. Lakes are scattered all over the country. Some of the lakes, such as the large Haarlem Lake, have been drained, and their beds converted into arable land.

Climate. The climate is moist and with small range in temperature. The summers are not very warm, nor are the winters often very cold. With an average annual temperature at Utrecht of 50° F., the mean temperature is 49° F. in the spring and autumn, 64.4° F. in July and August, and 35.6° F. in January. The annual precipitation is about 30 inches, rain falling on about 204 days in the year on the average, snow on 19, and thunder showers occur on 18. The fact that most days are misty and damp, a week of bright weather being a rarity, induces the diseases which characterize such conditions. Marsh fevers are also prevalent in the boggy districts, and though on the whole Holland is regarded as having a healthful climate, the annual death rate in the western lowlands is from 30 to 40 per 1000, which is about one-third greater than in other parts of the Kingdom.

Soil and Vegetation. The country is poor in vegetable products excepting cultivated plants. The most fertile regions are those with a stiff clay soil on the reclaimed lands of the northern and western provinces and on the fluvial clays along the large rivers. These are the chief agri-

cultural and grazing lands, though the zone of cereals and some other crops also extends over a large part of the diluvial sands and gravels of the central regions. About one-fifth of the area is unproductive. The country is almost destitute of timber, scarcely one-fifteenth of the surface being occupied by woods. Pasturage covers about one-third of the country, and the arable lands, including the areas devoted to kitchen gardening, occupy rather less than one-third of the surface.

Fisheries. Fishing is important, the industry being divided into river and coast fishing and the deep-sea fishing. The chief products of the coast fisheries are sprats and the oyster, which thrives in the alluvial mud brought down by the rivers and is protected from high seas by the islands along the coast. The herring fishery is the most important branch of deep-sea fishing, the annual catch averaging upwards of 600,000 tons. In 1907 the herring catch was valued at 10,394,000 guilders, in 1910 at 11,655,000, and in 1912 at 10,764,000. The 1909 census returned 23,182 persons as engaged in the fisheries, etc.

Geology and Mineral Resources. Nearly the whole surface is covered by very recent Quaternary formations, diluvium occupying 40 per cent and alluvium 59 per cent of the area. The coal measures, chalk, and Tertiary sands and loams occupy only about 1 per cent of the surface and are found only in the extreme east and southeast. The diluvium was spread over the country during the Ice age from Scandinavia in the north, while in late stages of the period the Meuse and Rhine, swelled by the great volume of water from the melting ice, spread coarse sand and grit over the south. The winds, sea, rivers, and vegetation coöperated in the formation of the alluvial strata. Most of the country being composed of water or ice-borne débris, the supply of minerals is very small. Building stone is imported from Norway; the lack of this material has stimulated the production of brick and tile, which are made in abundance, chiefly from the Rhine clays, and are of superior quality. Some coal is mined near Limburg, but there is no iron, except a small quantity of bog iron ore obtained from the bog regions of the east. Turf or peat is cut in very large quantities.

Agriculture. Of the Dutch population, the census of Dec. 31, 1899, returned 570,278 as engaged in agriculture; the census of Dec. 31, 1909, 616,395 (504,174 male, 112,221 female). In the northern and western provinces and along the southern rivers agriculture has reached a high degree of development, but so large is the population of the Kingdom that production is insufficient to supply the home demand. For 1913 uncultivated land was reported at 818,179 hectares and cultivated land at 2,444,530. The former was classified as follows: waste land, 515,143 hectares; water and morass, 122,968; dike and road, 53,555; untaxable land, 78,347; building land and park, 48,166. Of the cultivated land in 1912, arable land comprised 822,255 hectares; meadow and pasture, 1,221,876; garden and market garden, 49,578; orchard and nursery, 29,081; forest, 257,939. In 1888 the number of farms was 164,878 (of which 58.5 per cent were worked by the owners); in 1898, 169,659 (56.6); in 1904, 182,566 (54.4); in 1910, 209,156 (50.8; of the total farm area in 1910, 47.1 per cent was worked by the owners). In 1910, farms of 5 hectares or less numbered 109,605; from 5 to 10, 41,439; from 10 to 20, 30,821; from 20 to 50, 23,797; from 50 to 100, 3278; 100 and over, 216. The leading crops are rye, potatoes and other vegetables, and sugar beets; on the sandy soils rye, potatoes, and buckwheat are conspicuous products, and on the clay soils sugar beets, wheat, and hops. The beets are grown especially on the richer lands along the rivers. Other important crops are oats, peas, beans, and flax. Quantities of vegetables are exported to England, but American wheat is required to supplement the cereal supply, as for bread the people prefer a mixture of rye and wheat. The following table shows for two years the area in hectares and the production of metric quintals of principal crops, with the yield per hectare in 1913:

CROPS	Hectares		Quintals		Qs. ha.
	1913	1914	1913	1914	
Wheat	57,147	58,567	1,382,916	1,464,175	24.2
Rye	228,194	226,673	4,227,165	3,717,437	18.5
Barley	26,833	27,101	679,487	698,879	25.3
Oats	140,728	139,945	3,065,136	2,896,861	21.8
Flax	14,650	8,193	282,577	..	5.6
Sugar beets	60,390	61,911	16,655,560	...	276.2
Potatoes	170,000	168,385	25,026,947	.. ....	147.2

* Seed; fibre, 75,323 quintals.

By careful and scientific tillage a large yield per hectare is obtained. The production, especially for export, of bulbs and shrubs is an important industry. Large areas of timber land were long ago cleared for cultivation, and the country is compelled to import most of its timber supply from various parts of Europe and from America.

Stock Raising. As the moist climate promotes the growth of grass, animal rearing is the most important resource of the country. Cattle raising has attained a development equaled in few other countries of the world. Cattle thrive best in the coast provinces. Dairy farming is also far advanced near the sea; butter production is large, and hundreds of thousands of the famous Dutch cheeses are sent to foreign markets. Horses are bred with great success in Friesland, Gelderland, and North Brabant. Sheep are reared more for their flesh than their wool, chiefly in North Holland and in the south. The poultry yards supply large quantities of eggs to England, and many pounds of honey are produced, chiefly among the higher lands of the east. Comparative figures for live stock in 1903 and 1913 respectively are as follows: horses, 295,500 and 334,400; cattle, 1,660,400 and 2,096,600 (cows in milk or with calf in 1913, 1,109,700); sheep, 652,200 and 842,000; goats, 169,500 and 232,500; swine, 882,100 and 1,350,200. Fowls increased from 6,709,600 in 1910 to 7,182,300 in 1913, and beehives from 69,400 to 69,700.

Manufactures. The country is of inferior importance as an industrial state. Coal and iron, the bases of large manufacturing development, are lacking, with the result that manufactures hardly meet the home demand and only a few articles are exported. There are a few coal mines in Limburg; the output in 1912 was 1,725,400 metric tons. The metal industries have been little developed, though coal and iron are brought to Amsterdam, Rotterdam, and The Hague for the construction of railway material, ships, machinery, and hardware. Many of the steel and iron ships owned in Holland are built

NETHERLANDS, BELGIUM
AND
GRAND DUCHY OF LUXEMBURG
SCALE OF MILES
0 5 10 20 30 40 50
SCALE OF KILOMETERS
0 10 20 40 60 80
Important towns are shown in heavy face type
Railways shown thus
Canals
NORTH SEA
ZUIDER ZEE
TERSCHELLING
VLIELAND
TEXEL
Helder
Den Burg
Harlingen
Leeuwarden
FRIESLAND
GRONINGEN
Groningen
Delfzijl
Emden
Aurich
DRENTHE
Assen
Emmen
Hoogeveen
Coevorden
Meppel
Steenwijk
Kampen
Zwolle
OVERYSSEL
Deventer
Enschede
Almelo
Hengelo
Rheine
Lingen
Neuenhaus
Purgsteinfurt
GELDERLAND
Arnhem
Nymegen
Zutphen
Apeldoorn
Ede
Rhenen
Vreden
Winterswijk
UTRECHT
Utrecht
Amersfoort
Hilversum
Amsterdam
Haarlem
Zaandam
Alkmaar
NORTH HOLLAND
Hoorn
Enkhuizen
Medemblik
Wieringen
Stavoren
Sloten
Lemmer
SOUTH HOLLAND
THE HAGUE
(s Gravenhage)
Leyden
Delft
Gouda
Rotterdam
Dordrecht
Schiedam
Scheveningen
Noordwijk aan Zee
Wijk aan Zee
Ymuiden
Veenendaal
Amerongen
Barneveld
Beekbergen
Ruurlo
Groenlo
Lichtenvoorde
Borculo
Terborg
Doetinchem
Tiel
Culemborg
Gorinchem
Woudrichem
Leerdam
Schoonhoven
Oudewater
Woerden
Alphen
Gouderak
Ameland
Schier-monnikoog
Rottum
Boschplaat
Lauwers Zee
Vlie Stroom
Eijerland Gat
Marsdiep
Texel
Helder
Callantsoog
Hollum
Ameland Zeegat
Frankeland
Franker Gat
Ems R.
Dollart
Lek R.
Waal R.
Maas R.
Rhine R.
Yssel R.
Zuider Zee
Noord Holland Canal
Amsterdam Canal
Merwede Canal
Zuid Willemsvaart
Twente Canal
Overyssel Canal
Hoek van Holland
Holland Hook
Brouwershaven Gat

NORTH BRABANT
ZEELAND
LIMBURG
ANTWERP
EAST FLANDERS
WEST FLANDERS
BRABANT
HAINAUT
NAMUR
LUXEMBURG
DUCHY OF LUXEMBURG
GERMANY
FRANCE
Ostend
Bruges
Ghent
Antwerp
Mechlin
Louvain
BRUSSELS
Tilburg
Breda
Middelburg
Roulers
Courtrai
Tournay
Lille
Roubaix
Valenciennes
Cambrai
Mons
Charleroi
Namur
Liege
Verviers
Maestricht
Aix la Chapelle
Cologne
Crefeld
Dusseldorf
Arlon
Longitude East from Greenwich
A
B
C
D
E
F
3°
4°
5°
6°
7°
50
51
3
4
5

in England. Tin plate is produced at The Hague, and gold and silver ware are manufactured at Amsterdam; but few fancy articles in metals are produced. Textile manufactures have been largely developed since the separation from Belgium in 1830. Calicoes are made in large quantities for trade with the East Indies, Africa, and China; the leading factories are in Overijssel and North Brabant. Amsterdam, Haarlem, and Leyden have dye works and calico-printing works. Linen is manufactured chiefly in the southeast and North Brabant. The best quality of sailcloth is made in North Holland and South Holland. Tilburg is the leading centre of the woolen industry, and the carpets of Deventer are in much request; but with the growth of the woolen industries in England, France, and Germany, Dutch woolens have declined in importance. Leather is manufactured in many towns, and earthenware throughout the country. Brick and tile works are found in many places; clay pipes are made in South Holland; Delft still produces the glazed earthenware that made the town famous; Maastricht also produces stoneware and glassware. The diamond cutters of Amsterdam are still famous, though their business is declining on account of the competition of Paris, London, and Antwerp. This industry is entirely in the hands of Jews. Many industries are connected with the transformation of agricultural products, as the manufacture of liqueurs distilled from orange peel and other materials in Amsterdam, Rotterdam, and Schiedam, the same cities also leading in the production of Holland gin, distilled from rye. There were 401 distilleries in 1913, 418 breweries, and 64 vinegar works. Large quantities of cigars and manufactured tobacco are made, the most extensive factories being at Amsterdam and Utrecht. The sugar refineries, chiefly in Amsterdam and North Brabant, are using every year more raw sugar from beetroot and less from sugar cane. In 1913 there were 11 sugar refineries and 27 beet-sugar mills. The amount of raw beet sugar produced in 1912 was reported at 295,914 metric tons; refined sugar, 223,944; bastard, 7244; raw sugar clarified, 431.

Commerce. The Dutch trade, which embraces every continent, is largely maritime. Most exports of home products go to the neighboring countries of Europe. England, Germany, and Belgium are the largest buyers of the live animals, butter, cheese, and oleomargarine which the country exports.

The exports of colonial products are sold all over the world, and a large part of the trade is in the import and reëxport of these colonial commodities. The Dutch colonial possessions in the East Indies, extending from Sumatra to New Guinea, are nearly 60 times as large as the mother country and have over six times the population. Most of the tea, sugar, coffee, cinchona, tin, tobacco, indigo, dyewoods, spices, and gums that they export are sent to the Netherlands, chiefly to Rotterdam. Palm oil, rubber, and ivory from the Belgian Congo and guano and nitrates from South America are also imported. Some of these articles are greatly enhanced in value by manufacture in the Netherlands. Quinine, e.g., is prepared for the market in the Netherlands, where also Java raw sugar is refined and Sumatra tobacco is made into cigars. The colonies, on the other hand, buy from the mother country great quantities of cottons and of other goods manufactured for them at home or purchased in other lands and sold by Dutch merchants in the colonies at a large profit. The colonies are the best customers of the Netherlands, excepting Europe.

Most of the imports for home consumption come from northern Europe and the United States. The United States contributes about one-tenth of these imports on an average, chiefly wheat, flour, corn, rye, petroleum, tallow, bacon, leaf tobacco, and lumber. Great Britain, Germany, Russia, and Belgium supply most of the other imports, consisting chiefly of coal, timber, metals, and manufactures. Most of the home trade, as distinguished from the colonial trade, is with these countries. The rapid growth of the imports for home consumption and the exports of home products may be seen from the following table, which shows in millions of guilders the trade in 1913 as compared with the annual average in preceding periods:

	1887–91	1897–1901	1907–11	1913
Imports	1,262	1,887	3,050	3,918
Exports	1,086	1,601	2,442	3,083

Classified imports and exports (special trade) were valued as follows in 1910 and 1912, in millions of guilders:

MERCHANDISE	Imports		Exports	
	1910	1912	1910	1912
Food products	843.1	901.2	822.2	914.1
Raw materials	1,273.0	1,391.3	921.0	1,038.4
Manufactures	572.7	695.0	508.4	584.0
Miscellaneous	544.0	579.9	365.8	558.3
Total mdse.	3,232.8	3,567.4	2,617.4	3,094.8
Precious metals	32.4	45.6	14.9	18.3
Total	3,265.2	3,613.0	2,632.3	3,113.1

The percentage of principal imports on total imports (special trade) in 1902 and 1912 respectively was: cereals, 17.79 and 16.20; drugs, chemicals, etc., 13.02 and 10.77; iron (raw and worked), 8.13 and 7.34; coal, 2.59 and 3.43; rice (included above in cereals), 3.04 and 2.75; stone, etc., 3.34 and 2.68; yarn, 1.62 and 1.66; coffee, 2.69 and 1.41; raw cotton, 1.09 and 1.17; raw sugar, 1.65 and 0.69; total of these articles, 51.91 and 45.35. The percentage of principal exports in 1902 and 1912 was: cereals, 14.97 and 12.48; drugs, chemicals, etc., 13.57 and 9.28; iron (raw and worked), 7.40 and 6.01; butter and oleomargarine, 3.43 and 2.80; refined sugar, 2.82 and 1.97; coffee, 1.84 and 1.16; cattle, 0.27 and 0.79; raw cotton, 0.59 and 0.68; yarn, 0.60 and 0.38; total of these articles, 46.06 and 35.55. The table on page 760 shows the trade by countries in 1910 and 1912, in millions of guilders.

The Dutch derive large profit from the forwarding trade. They find the business of carrying freight for other nations a very profitable branch of commerce, and their position at the mouth of the Rhine gives them unsurpassed opportunities to pursue this branch of business. A great deal of the trade of Germany and also of Austria and Switzerland with other countries passes though the Netherlands, and most of it is tributary to Rotterdam, the port of the Rhine

mouth and one of the greatest forwarding ports of the world. Amsterdam's connection by river and canal with the Rhine enables that city to take a large though inferior part in the transit

COUNTRIES	Imports		Exports	
	1910	1912	1910	1912
Germany	826.1	1,051.1	1,319.9	1,555.0
Dutch East Indies	493.8	495.8	113.7	154.2
United States	295.2	362.0	84.7	135.5
United Kingdom	321.7	354.4	528.8	604.7
Belgium	301.0	343.6	329.8	370.7
Russia	433.3	291.7	15.6	25.1
Spain	83.2	103.9	6.0	9.1
British East India	81.0	87.3	3.8	7.9
Sweden	52.6	59.8	18.3	27.5
Rumania	68.9	59.2	4.0	6.7
Norway	32.8	47.0	16.5	22.4
Brazil	29.9	31.6	1.2	2.1
France	38.1	30.6	23.7	25.0
Italy	10.7	13.2	24.0	23.5
Turkey	15.0	10.6	21.7	19.2
Africa	10.8	9.4	31.7	18.9
Other	171.1	261.8	88.9	105.6
Total	3,265.2	3,613.0	2,632.3	3,113.1

trade. The volume of the transit trade in 1912 amounted to 2,287,000 metric tons with transshipment and 12,419,000 metric tons without transshipment.

Free trade is the government policy, duties being levied on a few articles only for purposes of revenue. The chief centres of domestic trade are Rotterdam, Amsterdam, Flushing, Dordrecht (timber), Middelburg, Leyden, Utrecht, Alkmaar, and Hoorn (cheese).

Shipping. Shipping entered at the ports, with cargo and in ballast, increased from 11,989 vessels of 29,856,000 cubic meters net in 1903 to 17,000 of 49,061,000 cu. m. in 1912; and cleared, from 12,012 vessels of 29,679,000 cu. m. to 17,150 vessels of 48,777,000 cu. m. In 1912 vessels entered with cargo had a net capacity of 45,820,000 cu. m. and cleared 29,475,000; in ballast, 3,241,000 and 19,302,000. Entered in 1912, Dutch vessels 4605 of 12,196,000 cu. m., and foreign vessels 12,395 of 36,865,000 cu. m.; cleared, Dutch 4776 of 12,346,000 cu. m., and foreign 12,374 of 36,431,000 cu. m. Steamers and sailing vessels respectively entered in 1912: Dutch, 3897 of 11,949,000 cu. m. and 708 of 247,000 cu. m.; foreign, 11,856 of 36,134,000 cu. m. and 539 of 731,000 cu. m.; total, 15,753 of 48,082,000 cu. m. and 1247 of 978,000 cu. m.; cleared: Dutch, 3903 of 12,068,000 cu. m., and 873 of 279,000 cu. m.; foreign, 11,716 of 35,685,000 cu. m. and 658 of 746,000 cu. m.; total, 15,619 of 47,753,000 cu. m. and 1531 of 1,025,000 cu. m. The port of Rotterdam has a notable preponderance of shipping; as seen in the shipping table, showing the capacity, in thousands of cubic meters, of vessels with cargo entered and cleared at the principal ports in 1908 and 1912.

The Dutch merchant marine on Dec. 31, 1903, numbered 268 steamers of 956,000 cubic meters net and 439 sail of 164,000 cu. m. net; total, 707 vessels of 1,120,000 cu. m.; on Dec. 31, 1912, 367 steamers of 1,632,000 cu. m. and 413 sail of 115,000 cu. m.; total, 780 of 1,747,000 cu. m.

Transportation and Communications. The largest routes of trade by water or rail converge on Rotterdam, Amsterdam, and Flushing. Great ship canals have given their preëminence to Rotterdam and Amsterdam. Rotterdam, near the mouth of the Meuse, was threatened with being cut off from the sea by accumulations of sand in the river; a new waterway was therefore dug across the Hook of Holland, through the dunes to the north of the Meuse, by which ships of the heaviest tonnage now reach the town. Steamers ply between Rotterdam and all the larger ports of western and northern Europe and to the

PORTS	Entered		Cleared	
	1908	1912	1908	1912
Rotterdam	23,779	30,868	10,033	16,820
Amsterdam	5,380	6,073	3,612	4,999
Flushing	1,925	2,338	1,947	2,299
Hoek van Holland	778	1,006	1,493	989
Harlingen	440	423	364	436
Terneuzen	458	509	210	180
Total, incl. others	35,796	45,820	20,179	29,475

East Indies and United States. The traffic by sailing ships with the colonies and other distant lands is also important. Amsterdam is also connected by regular lines of steamers with many ports of Europe, America, and Asia. Two ship canals connect Amsterdam with the sea. The older is the North Holland Canal, extending from Amsterdam to Alkmaar and Helder, 52 miles long, completed in 1825. By means of this canal the dangerous passage of the Zuider Zee was avoided. In recent years, however, the importance of the canal declined, as it is not wide enough for the more modern large ships. The North Sea Canal was therefore built between Amsterdam and the North Sea, 16 miles in length and fully meeting the requirements of modern trade. These are the great ship canals of the Netherlands, but the whole country is a land of canals. All the towns and even the villages are connected with one another by these waterways. The larger canals are over 60 feet broad, 6 to 9 feet deep, and sometimes they lie higher than the fields through which they pass. The domestic traffic of the country is carried on the canals. There is little coasting trade, because commodities are carried from one port to another on the canals. The total extent of the canals is nearly 2000 miles, and the length of navigable waters outside of the canals is about 3000 miles.

The railroads are of more importance for international than for internal commerce. They carry most of the freight that England sends into central Europe. Flushing, on the Scheldt, and Hoek van Holland, near Rotterdam, are ports on the main rail routes between England and Germany. The length of railway in operation in the Kingdom was 17 kilometers in 1839. It had increased to 176 in 1850; 1419 in 1870; 2610 in 1890; 2771 in 1900; 3190 in 1910; and 3305 (2054 miles) in 1913. Of the 3256 kilometers in operation at the end of 1912, 1792 were comprised in state lines. Good wagon roads in all parts of the country, paved with brick (klinkers), supplement the other excellent means of communication. Their total length is about 3000 miles.

Banking. All banks are private banks, and the Bank of the Netherlands is the only one that is permitted to issue bank notes. The money in general circulation, however, is chiefly silver. Two-fifths of the paper money in circulation must be covered. The bank secured the right to issue bank notes in 1863 for 25 years; in 1888 the right was prolonged for 15 years, with a

continuation for 10 years more unless rescinded by the government or the bank, two years' notice being given. In 1903 the right was renewed for another term of 15 years, with some alterations in the conditions. The Bank of the Netherlands has branches in all important towns and does the same business as other banks, but provides more guarantees. It is the depository of the state funds and of the cash of the Post Office Savings Bank. On March 31, 1914, notes in circulation amounted to 312,856,000 guilders; total exchanges for the year then ended, 902,590,000 guilders (in 1913 specie for notes, 143,483,675; notes for notes, 580,361,385; notes for specie, 127,864,869). In July, 1914, the bank's stock of gold was 160,064,000 guilders, and of silver 9,617,000 guilders. The bank receives 3½ per cent of the profits, the balance being divided between the state and the bank in proportion of two to one. In 1912 there were 284 private savings banks, with 470,333 depositors and 118,935,000 guilders deposits. The State Postal Savings Bank in 1912 had 1,607,016 depositors and 176,657,000 guilders deposits.

Finance. Revenue and expenditure of the government are reported as follows, in thousands of guilders:

	1890	1900	1905	1910	1912
Revenue....	165,938	155,391	175,963	200,092	212,838
Expenditure	165,938	155,391	175,963	203,947	226,219

The budget for 1915 showed estimated revenue of 216,206,805 guilders (direct taxes, 55,231,000; excise, 63,455,000; customs, 17,281,000); estimated expenditure, 255,100,900 guilders. The principal avenues of estimated expenditure were: finance, 51,112,808 guilders; interior, 43,119,653; public debt, 38,593,304; war, 36,889,976; agriculture, industry, and commerce, 28,781,153; marine, 19,095,689; communications, 18,716,913. Direct tax per capita and excise per capita were 5.99 and 6.31 guilders respectively in the decade 1841–50; in 1861–70, 6.05 and 6.49; in 1881–90, 6.16 and 9.78; in 1901–10, 7.25 and 10.08; in 1911, 8.16 and 10.50; in 1912, 8.33 and 10.61.

The public debt in 1890 amounted to 1,073,386,000 guilders; in 1900, 1,145,247,000; in 1910, 1,122,434,000; in 1911, 1,116,652,000; in 1912, 1,163,238,000; in 1915, 1,140,272,000. Interest on the public debt in 1914, 32,471,613 guilders; amortization, 6,121,500.

Money, Weights, and Measures. The standard of value in the Netherlands since 1875 has been gold. The unit of value is the guilder (or gulden or florin). The par value of the guilder is 40.196 cents, or 2.48787 guilders to the American dollar. The 10-guilder gold piece weighs 6.720 grams, 0.900 fine, thus containing 6.048 grams of fine gold. There is also a 5-guilder gold piece. The 1-guilder silver piece weighs 10 grams, 0.945 fine, containing 9.45 grams of fine silver. There is a subsidiary coinage of silver, nickel, and bronze. Metric weights and measures are used.

Population. The total area of the Kingdom, based on a low-tide planimetric calculation, is stated at 40,828.71 square kilometers (15,764 square miles). This figure includes the Zuider Zee, the Dollart, the Wadden (the shallows extending along Friesland and Groningen as far as the Dollart), the rivers of Zeeland and South Holland, and other waters. Exclusive of these waters, but inclusive of waters comprised in the communal areas, the area of the Kingdom is 34,185.81 square kilometers (13,199 square miles). What may be called the land area is 32,600.25 square kilometers (12,588 square miles). According to census returns, the population has been as follows: Jan. 1, 1830, 2,613,487; Dec. 31, 1859, 3,309,128; Dec. 31, 1879, 4,012,693; Dec. 31, 1889, 4,511,415; Dec. 31, 1899, 5,104,137; Dec. 31, 1909, 5,858,175; Dec. 31, 1920, 6,841,155. The following table shows by provinces the area (column 1) and the land area (column 2) in square kilometers, the population according to three successive censuses, the density in 1909 per square kilometer corresponding to the areas in columns 1 and 2, and the population as estimated at the end of 1913:

PROVINCES	Area		Population			Density, 1909		Estimated pop., 1913
	1	2	1889	1899	1909	1	2	
North Brabant	5,098.43	4,972.84	509,628	553,842	623,079	122.21	125.30	657,674
Gelderland	5,089.45	5,024.40	512,202	566,549	639,602	125.67	127.30	670,255
South Holland	3,130.35	2,931.00	949,641	1,144,448	1,390,744	444.27	474.47	1,502,105
North Holland	2,797.70	2,762.01	829,489	968,131	1,107,693	395.93	401.05	1,176,449
Zeeland	2,729.99	1,831.75	199,234	216,295	232,515	85.18	126.93	237,508
Utrecht	1,385.43	1,363.21	221,007	251,034	288,514	208.25	211.64	301,936
Friesland	3,320.33	3,220.25	335,558	340,262	359,552	108.29	111.65	368,088
Overijssel	3,398.68	3,354.50	295,445	333,338	382,880	112.65	114.14	403,460
Groningen	2,363.99	2,283.52	272,786	299,602	328,045	138.77	143.66	340,211
Drenthe	2,665.50	2,662.09	130,704	148,544	173,318	65.02	65.11	184,308
Limburg	2,205.96	2,194.68	255,721	281,934	332,007	150.50	151.28	370,207
Kingdom	*34,185.81	†32,600.25	4,511,415	5,104,137	5,858,175	171.36	179.70	6,212,701

* 13,199 square miles.

† 12,588 square miles.

At the 1909 census males numbered 2,899,125 and females 2,959,050. Of males in 1899, 63 per cent, and of females 60.4 per cent, were unmarried; in 1909, 62.3 and 59.8; married in 1899, 33.2 per cent of males and 32.4 of females; in 1909, 34.2 and 33.6; widowed in 1899, 3.5 per cent of males and 6.9 of females; in 1909, 3.2 and 6.3. Divorced and separated males increased from 3548 in 1899 to 5394 in 1909; females, 5452 to 8184. By nationality in 1909 the population was as follows: Dutch, 5,788,193; German, 37,534; Belgian, 18,338; French, 2645; British, 2102; Austro-Hungarian, 1223; other, 3908; not stated, 4152; total, 5,858,175. The average annual increase of population in the decade 1880–89 was 0.682 per cent; in 1890–99, 1.026; in 1900–09, 1.776. Calculations for 1910 show an increase of 2.53 per cent; for 1911, 2.36; for 1912, 2.85.

The increase is almost entirely due to excess of births over deaths. In 1902 the marriage rate was 7.58 and, in 1912, 7.65; living-birth rate, 31.8 and 28.1; death rate, 16.3 and 12.3; rate of excess of living births over deaths, 15.5 and 15.8. Of total births, 4.08 per cent were stillbirths in 1902 and 3.75 per cent in 1912. Emigrants from Dutch ports in 1912 numbered 72,509; of these only 2155 were Dutch. The aggregate population of communes with over 20,000 was 28.5 per cent of the total population in 1830; in 1859, 28.4; in 1889, 34.4; in 1909, 40.5; in 1912, 40.6. Communes with over 20,000 numbered 31 in 1909 and 1912. The largest communes, with population calculated for the end of 1913, are: Amsterdam, 595,250, (1920, 642,162; Rotterdam, 1920, 510,538;) The Hague, 301,851; Utrecht, 124,415; Groningen, 79,082; Haarlem, 71,176; Arnhem, 65,018; Leyden, 59,500; Nijmegen, 59,147; Tilburg, 54,641; Dordrecht, 48,984; Maastricht, 39,429.

Education. Attendance at school was made compulsory in 1900. No religious instruction is given in the public schools, and a very large number of the youth attend denominational private schools. In 1912 there were 3313 public elementary schools, with 18,817 teachers and 566,867 pupils; 2121 private elementary schools, with 12,404 teachers and 365,887 pupils; 171 public infant schools, with 31,416 pupils; and 1111 private infant schools, with 138,769 pupils. The polytechnic school (Delft) had about 70 teachers and 1300 pupils; 104 middle-class schools, 1627 teachers and 15,153 pupils; 11 navigation schools, 98 teachers and 913 pupils; 435 day and evening schools for working people, 3195 teachers and 36,803 pupils; 31 classical schools, 471 teachers and 2527 pupils. The four public universities at Leyden, Utrecht (qq.v.), Groningen, and Amsterdam had about 300 teachers and 4004 students, of whom 689 were female. Several art schools, museums, and military, music, normal, deaf-mute, and technical schools are supported by the government. The private schools are largely aided by the state. In 1904, 2.1 per cent of the conscripts could neither read nor write; in 1912, 0.8 per cent. Drenthe showed the highest percentage of illiterates, 7.5 in 1904 and 2.6 in 1912.

Religion. There are numerous creeds and sects and complete religious freedom. Most of the Protestants belong to the Dutch Reformed church, and many other sects are represented. The Roman Catholic church is under an archbishop in Utrecht with the bishoprics of Breda, Haarlem, Bois-le-Duc, and Roermond, and the Jansenists are under an archbishop in Utrecht and two bishops in Deventer and Haarlem. The Jews fall into two religious societies, the Dutch Israelites and the Portuguese Israelites. The censuses of 1899 and 1909 respectively returned the population by religion as follows: Dutch Reformed, 2,471,021 and 2,588,261; other Protestants, 599,111 and 746,186; Roman Catholics, 1,790,161 and 2,053,021; Jansenists, 8754 and 10,082; Jews, 103,988 and 106,309; others, including those without creed, 132,102 and 353,158. Most of the Roman Catholics live south of the Rhine, and most of the Jews in North Holland and South Holland. See REFORMATION.

Charities. The state leaves poor relief largely with the religious societies and organized private charity. Mendicity and vagrancy are treated as crimes. Poorhouses are found in very few communes, and pauperism is decreasing. For 1910 the number of persons in receipt of poor relief, including temporary as well as continuous relief, was reported at 326,299.

Literature. See DUTCH LITERATURE.

Ethnology. Of the early peoples of the Netherlands little is known, except that portions of the country were inhabited successively by tribes of the Stone, Bronze, and Iron ages. In the time of Cæsar the tribes of the swampy lowlands of the south were of Celtic stock, as the Nervii and Menapii. In the north were the Frisians, and in the central portion were the Batavians and Caninefates, of Teutonic stock, speaking Low Dutch. The Batavians belonged to the Chatti, who had moved in from the east, pushing the Celts into the outskirts. During the Roman occupation the Celts of the south were crushed, the Frisians were compelled to pay tribute, and the Batavians were conciliated and later supplied the best of soldiers for the Roman armies. In the fifth century the Roman power was broken by the Germans, and in this period of the swarming of nations the westward-moving tribes overflowed the Netherlands. The Saxons amid these changes occupied the country and crossed over to England. The ethnical components have remained constant in the centuries that have supervened. The home of the Frisians, who in the early part of the Middle Ages dwelt along the coast as far south as the Scheldt, has been contracted to a small area. The anthropological survey of the country shows a preponderance of the long-headed, blond, tall, Teutonic type in the north and east, with cephalic index of from 79 to 80. In North Holland and South Holland there is a large element having Alpine affinity, with cephalic index from 83 to 84. In Zeeland the pure Alpine or Celtic head form is found with an index of from 85 to 88, dark hair and skin, and medium stature, which is 1.655 meters, while that of the Teutonic element, as in Overijssel, is 1.701 meters.

Government. The basis of the present constitution of the Netherlands is the fundamental Law of 1815, as successively revised in 1848, 1884, and 1887. According to this constitution the state is an hereditary monarchy, having the system of parliamentary government. Royal succession is in the direct male line by primogeniture, transmissible, in default of male heirs, to the female line. In default of all legal heirs, the successor is determined by a joint meeting of the two chambers of the parliament (each containing twice the usual number of members). The sovereign attains his or her majority at the age of 18.

The executive power is vested in the sovereign. The legislative power is vested conjointly in the sovereign and the parliament, or States-General. The parliament consists of two chambers with considerable inequality of powers in legislation. The First Chamber is composed of 50 members elected by the legislatures (Provincial States) of the several provinces and from among the highest taxpayers and certain high officials designated by law. Their term is nine years, one-third retiring every three years. Those members not residing at The Hague, the seat of government, are allowed a compensation of 10 guilders per day during the session of the States-General. The Second Chamber is composed of 100 members, elected by direct vote to represent districts. Those qualified to vote for members of the Second Chamber include all male citizens not less than 25 years of age who are owners or tenants of houses or boats (of 24 tons or more) or who

manifest, as by the payment of a direct tax, certain evidences of capacity and business ability. In 1913 the electoral body comprised about 68 per cent of the male subjects of voting age.

The members of the Second Chamber serve for a term of four years and retire in a body. Any Netherlander who has attained the age of 30 years and who is in the full enjoyment of his civil and political rights is eligible to membership in the Second Chamber. The members receive an annual salary of 2000 guilders, besides traveling expenses. The sessions of the chambers are public, although each by a majority vote may hold secret sessions. Either may be dissolved by the sovereign without the sitting of the other chamber being disturbed, but in case of dissolution new elections must be held within 40 days and the chambers convoked within two months. Ordinarily both chambers meet at least once a year and may be summoned in extraordinary session by the sovereign. The presiding officer of each chamber is appointed by the sovereign, but minor officers are elected by the chambers respectively. The First Chamber has no power of initiating legislative measures, its authority being confined to the simple approval or rejection in toto of bills sent to it from the Second Chamber. The Second Chamber has the special power of appointing commissions of inquiry; it shares with the sovereign the right of initiating legislative measures and may amend the bills presented by the government; to it the government must submit the annual budget; and it alone has the right to impeach the ministers before the High Court at The Hague.

The sovereign, who is declared to be inviolable and irresponsible, is required to take an oath to maintain the constitution, the independence of the country, and the liberties and rights of the citizens, and to execute the laws. The powers of the sovereign include the dissolution of the chambers, either jointly or separately; the declaration of war; the superior direction of foreign affairs; the negotiation of treaties with foreign Powers subject to the approval of the chambers, when the cession or exchange of territory is involved or when rights established by law are affected; the command of the army and navy and the appointment of military officers; the superior direction of the colonies; the general administration of the finances; the granting of pardons (but not amnesties); the fixing of salaries of public officers except in case of the judges; and the decision of administrative conflicts between the provinces. The executive powers of the sovereign are exercised through ministers, one of whom must countersign every official act of the sovereign and who thereby assumes the responsibility for it. The political responsibility of the ministers is to the States-General, to each house of which they are entitled to have access, whether members or not, and to speak, although not to vote unless they be members. At present (1915) there are, besides three ministers without portfolio, nine ministers presiding over departments, viz.: Foreign Affairs; Interior; Finance; Justice; Colonies; Marine; War; Communications; Agriculture, Industry, and Commerce. Each minister with portfolio receives an annual salary of 12,000 guilders. Besides the ministry there is a Council of State, presided over by the sovereign and consulted on a variety of important matters of state administration.

For the purpose of local government the Kingdom is divided into 11 provinces, and these are again subdivided into 1121 communes (*gemeenten*). The chief executive authority in each province is a commissioner of the sovereign. In each province is also a representative assembly (Provincial States) consisting of members elected for six years, one-half of the members retiring every three years. The number of members constituting an assembly varies from 35 to 80, according to the population of the province. The powers of the provincial assemblies are in general those of a local legislative body and include such duties as the enactment of ordinances and the levy of taxes. All ordinances to be valid must be approved by the sovereign. The assemblies exercise a supervisory control over the municipalities and elect the members of the First Chamber of the States-General. Ordinarily they hold sessions twice a year and are presided over by the commissioner of the sovereign. For the conduct of the provincial administration a deputation of six members is chosen from the body of the provincial assembly and is known as the Deputed States. In each commune is a local council elected for six years by the same electorate as that which chooses the members of the provincial assembly. The number of members varies from 7 to 45, according to the population of the commune, and one-third of the members retire every two years. The powers and duties of the communal council include the enactment of by-laws and ordinances relating to matters of purely local concern. These are all subject to the veto of the sovereign, while the budget and ordinances for the alienation of municipal property require the approval of the Deputed States of the province. The council is presided over by a mayor or burgomaster appointed by the sovereign for six years. He is the chief executive officer in the commune and is assisted by from two to six aldermen (the number depending upon the population of the commune) elected by the council from its own membership. The mayor exercises a supervisory power over the actions of the council and may suspend its resolutions for a period of 30 days. He also has charge of the municipal police.

The judicial system consists of the High Court of the Netherlands (Court of Cassation), which sits at The Hague, five courts of appeal, 23 district courts, and 106 cantonal tribunals. The High Court has original jurisdiction in matters concerning the state and the royal family, in the impeachment of ministers, and in offenses committed by the higher officials. It has appellate jurisdiction in cases appealed from the provincial courts and the courts in the colonies. All judges are appointed by the sovereign for life, except the cantonal judges, whose tenure is limited to five years, and they are irremovable except by resolution of the High Court. Trial by jury does not exist in the Netherlands. For navy, see NAVIES.

Army. *Higher Organization.*—The system provides for an initial mobilization of four divisions and one cavalry brigade. A division consists of three brigades of infantry, each of two regiments of three battalions; one field-artillery regiment consisting of 12 three-gun batteries, or a total of 36 guns to the division; a company of cyclists, eight machine guns, and one company of engineers. Total strength of a division about 19,000 officers and men. The cavalry brigade of four regiments of four squadrons each has attached to it four three-gun batteries of horse artillery. The total strength of this field army

when mobilized for war is about 125,000 men and 152 guns. The permanent peace strength maintained as the skeleton upon which the field army is mobilized in war consists of about 1500 officers and 22,000 men. *Service.*—Liability to service in time of war is universal and compulsory from the age of 19 to 40. In time of peace, under the Law of 1912, service is partly voluntary and partly compulsory, the larger number of men being from the latter class. The annual contingent is limited to 23,000 men, the selection being by lot and substitution not being permitted. Volunteers enlist for 10 years, of which period only two or three years are with the colors. Reenlistment of noncommissioned officers is authorized and encouraged. The service of the conscripted militiaman, assigned for training to the permanent units, is divided as follows: (*a*) active army, six years (eight for mounted troops), of which period two years only are continuous service for mounted troops, 8½ months for infantry. Subsequently during this period the mounted troops may be called out once for a period of one month, the dismounted troops twice for four and three weeks respectively. (*b*) Landwehr service: seven or five years, during which period the men may be turned out for training twice for six days only. (*c*) Landsturm service: period eight years. This class includes all men, those who have had active training and those who have not. This completes the liability of 21 years ending at the age of 40.

For each dismounted unit of the active army there is a corresponding unit of Landwehr troops, the necessary skeleton organization being maintained in time of peace.

The fortresses normally are garrisoned by 57 artillery companies organized into battalions of suitable strength for the armament to be manned. In war these troops are supplemented by Landwehr companies. Extensive seacoast and land fortifications are maintained with effective provision for utilizing inundation as a defensive measure. The defensive scheme includes concentration of all the forces in what is called the Holland Fortress, a large area partly surrounded by the sea, and permanent works, the approaches to which may be controlled by inundation. *Arms.*—Infantry, the Mannlicher magazine rifle; cavalry, the carbine; field artillery, a late model rapid-fire Krupp gun, 75 millimeters' caliber. *Normal Military Budget.*—Home defense about $14,000,000; colonial defense about $16,000,000. Surrounded by the sea, Germany, and Belgium, the Netherlands were in a critical political and military situation during the European War which began in 1914 and were forced to expend sums, greatly in excess of the normal annual budget, in military preparations, reorganizations, and increase, and to maintain mobilized large forces. See CAVALRY.

Defense. There are few fortresses protecting the national boundaries. The chief, most effective defense lies in the ability to open the dikes and flood the region between the Lek and the Zuider Zee.

Colonies. The Netherlands are one of the important colonial powers. The Dutch colonies form two groups: the Dutch East Indies (q.v.) and the Dutch West Indies. The statistics—totals—are approximately: estimated area in square miles, Dutch East Indies, 736,400; Dutch West Indies, 46,460; total, 782,860; estimated population of Dutch East Indies in 1905, 37,979,000; Dutch West Indies in 1912, 149,800. The Dutch West Indies comprise the colony of Dutch Guiana, or Surinam (see under GUIANA), area 46,060 square miles, population 86,134; and the colony of Curaçao (q.v.), including the islands of Aruba (q.v.), Buen Ayre (q.v.), Eustatius (q.v.), Saba (q.v.), and half of St. Martin (q.v.), total area 403 square miles, population 55,200.

History. The name Netherlands or Low Countries originally covered the territory included in the kingdoms of the Netherlands and Belgium, with Luxemburg. This region was inhabited in Roman times by the Frisii in the north, the Batavi in the central portion, and the Belgæ in the south. These tribes were successively subjugated by the Romans—the Belgæ by Cæsar; the Batavi after Claudius Civilis, a Batavian leader, whose native name is unknown, had broken the Roman alliance and attempted to form a united Batavian kingdom (69–70 A.D.); and the Frisii still later after an obstinate resistance. The Low Countries were incorporated in the empire of Charles the Great and Christianized. Upon the breaking up of the Carolingian Empire the new Frankish kingdom acquired the southern portion, Lotharingia (Lorraine) the central, and the new Germany the northern part. Coincidentally with this division came the rise of feudalism, and duchies like Brabant (originally Lower Lorraine), counties like Artois, Flanders, Holland, and Hainault, and bishoprics like Utrecht and Liége developed a semi-independent authority in this remote district, where the weakened royal authority of the period reached with difficulty. (See BELGIUM.) It resulted also from the division of the country that, while the people as a whole retained certain traits due to their environment, the Dutch or northern provinces were distinctly Germanic in language and customs, the Flemings of central Netherlands showed in both respects a mingling of French and German elements, while the Walloons on the south were as markedly French as the Dutch were German. In the latter part of the Middle Ages the cities of the Netherlands rose through their commerce and manufactures to an extraordinary state of prosperity, and some of them were for a time virtually independent republics. Next to the Italian states they figured most prominently in the revival of art. The cities of Flanders and Brabant were especially flourishing. Bruges, Ghent, and Antwerp had the largest share in this prosperity—Antwerp, at the beginning of the sixteenth century, eclipsing all other cities of Europe in the volume of its trade and its financial transactions. A marriage alliance between the house of Flanders and that of Burgundy (1369) gave the Burgundian dukes, with their unbridled ambition for empire, a foothold in the Netherlands which they used to such purpose as to bring the whole country under their sway.

The Hapsburg-Burgundian alliance (the marriage of Maximilian of Austria and Mary of Burgundy) in 1477 made the Low Countries an appanage of the house of Hapsburg. Charles V, the grandson of Maximilian, in 1549 formally united this rich inheritance with the Spanish crown. In 1555 he resigned the sovereignty over the Netherlands to his son Philip II. At this time they comprised the four duchies of Brabant, Gelderland, Limburg, and Luxemburg; the seven counties of Artois, Flanders, Hainault, Holland, Namur, Zutphen, and Zeeland; the

margraviate of Antwerp; and the seigniories of Friesland, Groningen, Mechlin, Overijssel, and Utrecht. These provinces were very largely independent of each other and prized this independence. The States-General, to which each sent deputies, served to unify them to some extent, and a supreme tribunal had jurisdiction over all; but the States-General was, like similar bodies in that age, politically weak, without power of legislation or taxation. The acquisition of the country by Spain brought into close political conjunction two bitterly antagonistic forces, for all save the provinces of southern Netherlands was becoming strongly Protestant, while Spain was the most Catholic country in Europe. Under Charles V the Netherlands, which were included in the Burgundian Circle of the Holy Roman Empire, had been declared indivisible and not subject to the Imperial courts. He had subjected the Protestants to severe persecution and had established the Inquisition, but it was reserved for Philip II to show to what lengths bigotry, cruelty, and bad faith could be carried in the oppression of a people. The government during the regency of Margaret of Parma was carried on by Cardinal Granvelle (q.v.), who began at once to break the royal pledges and to trample upon the liberties of the people. Spanish troops were kept in the country, and time-honored privileges and rights were ignored. Protests and resistance soon began under the leadership of William of Orange, Stadholder of Holland, Zeeland, and Utrecht, Count Egmont, and the Count of Hoorne, which brought about the dismissal of the hated Minister (1564), but effected no change in Philip's policy towards the Netherlands. The league of the Beggars (see GUEUX) arose in 1566, and field preaching by proscribed Protestant ministers was carried on under the protection of armed multitudes. Mob violence broke out in many parts of the country, and the resentment of the people showed itself in the plundering and desecration of churches and the destruction of images and relics. Philip II proceeded to summary measures, strengthened by the support of a large peaceful element among the population who viewed with alarm the proceedings of the Beggars. In August, 1567, the Duke of Alva (q.v.) arrived with an army of Spanish veterans and authority to deal with the country as rebellious and conquered territory. Alva's Bloody Council, an irresponsible tribunal, condemned by wholesale Netherlanders guilty of no offense save their religion and love of country, and in February, 1568, the Holy Office of the Inquisition pronounced a death sentence against all the inhabitants of the Netherlands as heretics, with a few named exceptions. Among the notable victims of the tribunal were Counts Egmont and Horne. In the spring the Prince of Orange, who had fled the country, raised a small army and with his brother, Count Louis of Nassau, took the field for the liberties of the Netherlands, thus opening a desperate struggle lasting for 40 years, during which most of the principal towns endured sieges by the Spaniards and suffered wholesale massacres when taken. In May, Louis of Nassau defeated Count Aremberg, the Spanish Governor of Groningen, but he was driven from the field by Alva and fled to Germany with only a remnant of his troops. The first decisive triumph for the national cause was the capture of the fortified seaport of Briel by the Beggars of the Sea under Count de la Marck in April, 1572. This was followed by the revolt of the principal cities of Holland, Zeeland, and Friesland and many cities in Gelderland, and Overijssel. The Prince of Orange was proclaimed as lawful Stadholder of the King of Spain. The fortress of Mons, in the south, was taken by Count Louis of Nassau, but the expected reënforcements from France did not arrive, and the Massacre of St. Bartholomew was a severe blow to the Protestant cause in the Netherlands. Mons was retaken by the Spaniards in September, and in rapid succession other places (Mechlin, Zutphen, and Naarden) fell into their hands, their course everywhere being marked by ruthless cruelty. Haarlem was defended by a garrison of 4000 men against an army of 30,000 men under Don Frederick, a son of the Duke of Alva, and after enduring a siege of seven months surrendered only when reduced to the very verge of starvation. The little town of Alkmaar repelled all assaults by the Spanish soldiery and drove off an army of 16,000 men by cutting the dikes and flooding the country. In 1573 Alva was recalled by Philip II and succeeded by Requesens.

On sea the Dutch repeatedly defeated the Spanish fleets, but on land they suffered a severe reverse in the battle on the moor of Mook, near Nimeguen (April 15, 1574), in which Louis of Nassau and his brother Henry were slain and their entire army destroyed. Leyden, besieged by an army of 8000 Spaniards under Valdéz, held out for five months and was saved by the cutting of the dikes, which enabled the vessels of the Gueux to bring relief to the town. The death of Requesens in March, 1576, was followed by a mutiny of the Spanish troops (the so-called Spanish Fury). Freed from all discipline and clamorous for their pay, which had long been withheld, they brought a reign of terror on the country. Ghent, Utrecht, Valenciennes, Maastricht, and Antwerp were taken and plundered, and in the last-named city 8000 citizens are reported to have been put to death. The southern provinces turned in terror to William of Orange for aid and, with the exception of Luxemburg, entered into an alliance with the northern provinces, known as the Pacification of Ghent (Nov. 8, 1576). The authority of Philip was still nominally recognized. The pacification was completed by the Union of Brussels, January, 1577, the object of which was primarily the expulsion of the mutinous Spanish soldiers. The new viceroy, Don John of Austria, the half brother of Philip II, in order to gain time, was compelled on his arrival to grant the demands of the estates and issued the Perpetual Edict, confirming the terms of the Pacification of Ghent. He won a great victory at Gembloux on Jan. 31, 1578, but died in the same year and was succeeded by Alexander Farnese, Duke of Parma, one of the ablest men of his day as well as one of the most unscrupulous, who administered affairs with energy until 1592. A shrewd judge of men, he used bribery as well as force to divide and weaken the resistance, and he succeeded in fomenting dissensions between the northern and southern provinces, which had little sympathy save that arising from resistance to common oppression. The southern provinces were in great part won back for Spain, but at Utrecht in January, 1579, the seven northern provinces—Holland, Zeeland, Gelderland, Utrecht, Groningen, Overijssel, and Friesland—entered into a union that was virtually the founding

of the Dutch Republic, and on July 26, 1581, at The Hague, the seven provinces constituting the modern kingdom of the Netherlands declared their independence. William of Orange became the ruler of Holland and Zeeland, while the sovereignty over the other provinces was offered to the Duke of Anjou, brother of Henry III of France. The latter, however, aroused the enmity of the people by his attempt to seize Antwerp and left the country in 1583. On July 10, 1584, William of Orange was assassinated at Delft by an emissary of the Duke of Parma, but the United Provinces were saved from the full effects of the blow by affairs in France, where the struggle between the monarchy and the Catholic League diverted the attention of the Spanish King and led for a time to the withdrawal of the greater part of the Spanish troops from the Low Countries. In 1585 Antwerp, after a memorable siege of 14 months, was forced to surrender to the Duke of Parma. In 1585 an English army under the Earl of Leicester was sent by Elizabeth to the aid of the Dutch, but the incapacity of their commander made their assistance of little use, and in 1587 Leicester returned to England. The United Provinces nevertheless continued the struggle, guided by the statesmanship of Barneveldt (q.v.) and under the leadership of Maurice of Nassau, the eldest son of William of Orange. Maurice concluded a series of triumphant campaigns with the decisive victory of Nieuport, over the Archduke Albert of Austria, July 2, 1600. On sea the Dutch navies overwhelmed the Spanish forces and made themselves masters of the Spanish-Portuguese possessions in the East Indies. These years of warfare completed the desolation of the Spanish Netherlands. A respite came in 1609 with a 12 years' truce, which was a virtual acknowledgment of the independence of the Dutch Republic. For additional details of the struggle with Spain up to the truce of 1609, see ALVA; EGMONT; FARNESE; GUEUX; JOHN OF AUSTRIA; PHILIP II; MAURICE (of Nassau); WILLIAM I.

Political and religious dissensions now arose in the Republic. The Arminian controversy in the Church mingled itself unhappily with the political differences between Prince Maurice of Nassau and Barneveldt. Finally Barneveldt was seized, condemned without fair trial, and executed May 13, 1619. See BARNEVELDT; DORT, SYNOD OF; GROTIUS.

In the course of the struggle with Spain the foreign trade of the provinces had undergone a rapid expansion. The Dutch East India Company was organized in 1602. After the discovery of the Hudson River by Henry Hudson, sailing for the Dutch East India Company in 1609, the Dutch established by degrees a trading colony in New Netherland, later New York. The New Netherland Company was given a trading charter in 1615, and in 1621 the Dutch West India Company came into existence and began to people the new colony, which remained a Dutch possession until 1664, when it was taken by the English, to be recovered in 1673 for 15 months and then finally lost to the Republic.

In 1621 the 12 years' truce having expired and the Dutch refusing to acknowledge allegiance to Spain, the war was renewed by Philip IV. The Dutch, led by Prince Maurice until his death in 1625 and then by his brother Frederick Henry, with the French as allies, carried on a struggle for the possession of Flanders, the incidents of which served to increase the hostile feeling between the Catholic and Protestant parts of the country. In the meantime the religious dissensions in the United Provinces themselves died out, and a spirit of toleration arose which made the country the asylum for European Protestant refugees. In 1646 Spain began negotiations for peace with the Republic, and the Dutch, already suspicious of the growing French influence and themselves weary of the long struggle, made terms which became a part of the general Peace of Westphalia in 1648. The United Provinces were now fully recognized as free and sovereign states. The Scheldt was closed to commerce, and the right of the Dutch to a share in the trade of the Indies was acknowledged. William II, who succeeded Frederick Henry as Stadholder of the Republic, attempted to become a sovereign with the aid of France, but died at the age of 24, and the danger his ill-advised attempt had shown led the states to hold the stadholdership in abeyance. Holland, the wealthiest of the provinces, now became the real controlling force, and the executive power in Holland was vested in the Grand Pensionary, an office which from 1650 to 1672 was held by Jan de Witt (q.v.). This was the golden age of the Republic, when its fleets fought successfully against the English (1652–54, 1665–67) and made it the leading sea power of Europe. The prosperity, wealth, and power of the Republic brought it new enemies in the place of decadent Spain. Having united in 1668 with England and Sweden to hold Louis XIV in check, the Republic found itself in 1672 facing both France and England, the former attacking by land, the latter by sea. In this struggle William III, the young Prince of Orange, posthumous son of William II, by his generalship and patriotism won the approval of a large party of the nobles and common people, who demanded the restoration of the stadholdership. France had demanded the restoration of the house of Orange to its authority, but William had declined to receive a gift forced by the enemies of his country. Jan and Cornelius de Witt, who opposed vesting any further powers in the house of Orange, were murdered by a mob (1672), and the Prince of Orange became once more Stadholder and the central figure in the United Netherlands. In the shifting European policies of the succeeding years the Republic found itself sometimes with one ally, sometimes with another, sometimes single-handed, but with the calling of the Stadholder William to the English throne (1688) it was brought into the large scheme of the Grand Alliance against Louis XIV. William of Orange and Heinsius (q.v.), the Grand Pensionary of Holland, were the soul of the resistance to the schemes of the French King. (See LOUIS XIV.) By the Peace of Utrecht in 1713, closing the War of the Spanish Succession (see SUCCESSION WARS), the Spanish Netherlands were handed over to Austria. By the Barrier Treaty, concluded with England and Austria in 1715, the Dutch acquired the right of maintaining garrisons in the fortified towns of the Austrian (Belgian) Netherlands.

There was a decline in the prosperity of Holland in the first half of the eighteenth century. The stadholdership had been again set aside, but it was restored in 1747 and made hereditary in William IV of Nassau-Dietz. There were 40 years of peace, with the exception of a brief naval war with England which broke out at the close of 1780. In 1782 the States-General for-

mally recognized the United States of America as a sovereign and independent nation, being the second government in Europe to do so. The Stadholder's government was essentially aristocratic, and in 1786 the rising democratic tide drove out William V, who, however, was restored in the following year through the intervention of Prussia. The revolutionary movement in France found an echo in the United Provinces, where the democratic party welcomed the conquest of Pichegru (q.v.). The stadholdership was again overthrown, and the Batavian Republic was organized under French sympathizers and in close alliance with France in 1795. Napoleon made the Batavian Republic into the Kingdom of Holland, with his brother Louis as King (1806), but the latter was too faithful to the country to suit his Imperial brother and master, and he was compelled to abdicate (1810), and the country was annexed to the French Empire. In 1813 the French were expelled and the house of Orange was restored, and the Congress of Vienna (1815) annexed Belgium to Holland and created the new Kingdom of the Netherlands under the sovereignty of William I, the son of the last Stadholder. Luxemburg (q.v.) was at the same time erected into a grand duchy for the King of the Netherlands. In the course of the Napoleonic wars England seized the Dutch colonial possessions and at their close was allowed to retain Cape Colony, Ceylon, and a great part of Surinam. The Catholics of the Belgian provinces were not content with the union with Holland and revolted in 1830, and, after fruitless attempts by the King to suppress the revolt, the Powers intervened and created the independent Kingdom of Belgium, under a guarantee of neutrality. (See BELGIUM.) A final settlement with Belgium was not effected until 1839, when Limburg and Luxemburg were divided between the countries. William I abdicated in 1840 in favor of his son, William II, who was better able to enter upon harmonious relations with Belgium.

William II was succeeded by William III in 1849. The country for more than half a century has enjoyed a peaceful and prosperous development, untroubled by other problems than those of national finance, internal politics, and colonial administration.

The last is a question of much magnitude, as the Dutch colonial empire has a population of about 38,000,000 as compared with some 6,000,000 in the home country. The colonial possessions consist, in the Western Hemisphere, of Dutch Guiana and Curaçoa; and, in the Eastern, of Java, part of Borneo, Timor, the Moluccas, Celebes, and the western half of New Guinea. Slavery existed in the Western colonies until 1862 and, until recently, the so-called "culture system," by which the natives were forced to labor for their employers. The more liberal policy which has been adopted has opened the door to private enterprise, substituted more modern forms of taxation, developed an educational system, and established railways. Of all the Dutch colonies, Java is still the most important, containing about three-fourths of the Dutch in the East. The progress of Sumatra is one of the most noteworthy phenomena of recent European colonial history. Celebes and Dutch Borneo are not well developed, the majority of the natives being in a semibarbarous state. In 1902 and 1904 rebellions of a very serious nature occurred in Achin. The conduct of the Dutch troops was very severely arraigned in the home Parliament, because of their severity in suppressing the rebellion.

The government of Holland maintains colonies for vagrants. The chief institution is at Veernhingen and occupies 3000 acres, where some 4000 men are maintained from periods of six months to not more than three years. A similar institution for women has been established at Leyden.

The constitution, which had been much liberalized under the revolutionary influences of 1848, became fully democratized by the reforms of 1887 and 1896. In 1905 a royal commission recommended the adoption of proportional representation and woman suffrage. It is very probable that the former will be adopted; regarding the latter, progressive advance has been made. Women already possess the right to vote in the proceedings of the dike associations; in 1908 the Lutheran synod gave women the right to vote in ecclesiastical matters.

The two chief political parties in Holland until recently have been the Liberals and the Conservatives, the former composed largely of the representatives in the commercial towns and the latter of Orthodox Protestants and of the Roman Catholic peasantry, and supported generally by the Roman Catholics. Between 1871 and 1888 the Liberals were continuously in power; excepting a short break by the Roman Catholic Conservatives, they held office from 1891 to 1901. A coalition ministry of Conservative Protestants and Roman Catholics came into power and lasted until 1903. During the period from 1905 to 1907 the Liberals regained control. The Conservatives won in the election of 1908, and in 1909 the most remarkable of recent elections was held. This resulted in the election of 60 Conservatives, 40 Liberals, and 7 Socialists. It was believed in some quarters at the time that the election marked the downfall of Dutch liberalism; however, in the election of 1913 the Conservative cabinet was obliged to resign, and the Liberals were able to form a ministry under the leadership of Dr. Cort van der Linden, gaining the support of the Socialists by guaranteeing electoral reform and old-age pensions.

King William III died Nov. 23, 1890, and was succeeded by his daughter Wilhelmina, who was born Aug. 31, 1880. She married Prince Henry of Mecklenberg-Schwerin, Feb. 7, 1901; an heir was born April 30, 1909, amid great national rejoicing. In 1909 the Regency Bill was passed, by which the Dowager Queen Emma becomes Regent in case of the death of Queen Wilhelmina, and, on the death of the former, the Prince Consort during the heir's minority.

Although Holland has not progressed as fast as some of the other European states in the direction of social and political reform, yet it enacted an important social-insurance law. As early as 1894 a royal commission introduced a plan for obligatory accident insurance at the expense of the employers. A bill based on these recommendations became a law in 1901, and this has been amended several times since. By means of this law compulsory accident insurance is established in virtually all the Dutch industries. Sickness insurance is in the hands of some 700 mutual societies. State provisions for insurance against unemployment has been agitated, yet the Ghent system, by which such insurance is administered through the trade-

unions subsidized by the municipalities, still prevails. Recent elections make probable the adoption of old-age and widows' pensions.

The Coast Defense Bill, which was passed in May, 1913, and which provided for the fortification of Flushing and the expenditure of some 12,000,000 guilders, caused much comment in the European press. It was rumored that it was done at the behest of the German government as a protection against a possible English invasion.

Since 1890 the Dutch government has rendered a great deal of aid to the development of agriculture, which is still the greatest industry, the total value of the yearly production of which is some 600,000,000 guilders. Agricultural and horticultural schools have been organized, experimental stations have been established, and coöperative societies for buying and selling have spread all over the country, and everywhere coöperative creameries and credit banks have met the needs of the local farming communities.

In 1908 trouble broke out with Venezuela over the Dutch colony of Curaçoa. On June 23 of that year the Dutch Minister was given his passports; later four Dutch vessels were seized. A protocol was signed in 1909 by which the government of Venezuela agreed to pay an indemnity of 20,000 bolivars and the Netherlands to restore the coast guards captured in 1908.

During the war which broke out in Europe in 1914 Holland and her people played a very memorable part. On Oct. 19, 1914, after the fall of Antwerp, over 400,000 Belgian refugees fled to the Netherlands. In January, 1915, it was estimated that 1,200,000 Belgians had been quartered upon this small country, the burden being extremely severe, as the Dutch had to maintain, in addition to the Belgian refugees, an army of 300,000 men to prevent violations of their neutrality. Besides caring for the refugees, the Dutch government granted free use of its railways for the transportation of relief supplies to Belgium and gave to the American Belgian Relief Commission free transmission of letters and telegrams. After the fall of Antwerp, Holland greatly strengthened her barriers by placing barbed wire on all roads leading from Belgium and by guarding especially the territory south of the Scheldt. The preservation of that river's neutrality was a question of much magnitude. Authorities on international law maintained that the Dutch could not permit its navigation by any belligerent Power. The Dutch were in a precarious position in regard to the shipment of goods within their borders by neutral countries intended for belligerent Powers. On Feb. 15, 1915, the government of the Netherlands addressed a note to the British and German governments. The former was informed that the Dutch were opposed to the wholesale use of its flag by belligerents, and the latter that the destruction of neutral vessels without search was a contravention of international law and would not be tolerated. During the month of March the destruction of two Dutch merchantmen by a German submarine caused a great deal of feeling among the people. See WAR IN EUROPE; NATIONAL FLAGS, Plate.

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NETHERLANDS SCHOOLS OF PAINTING. Under this title may best be grouped Flemish and Dutch schools which sprung from the same source, possess in common certain

distinctive qualities, and have had a similar development. The Flemish school may be said to begin with Huybecht and Jan van Eyck (died 1440), whose remarkable improvement of oil painting revolutionized the art. The chief characteristics of the early Flemish school are a pronounced realism, highly detailed finish, and the use of landscape background; its best painters had a good sense of color, perspective, atmosphere, light and shade. Jan van Eyck founded the school of Bruges, the chief centre in Flanders; Rogier van der Weyden (died 1464) the school of Brabant, with a centre at Brussels, which was more emotional and dramatic in character; and Dierick Bouts, a Dutchman, the school of Louvain, distinguished by its treatment of light and shadow and of the landscape. The chief master of the second generation was Hugo van der Goes (died 1482) at Ghent. The two most important masters of the later fifteenth century headed the school of Bruges: Hans Memling (died 1494), of German extraction, whose works show a gentle spirituality, and Gerard David (died 1523), a Dutchman, in whose art both Dutch and Flemish art of the fifteenth century culminated. In the sixteenth century the chief seat of the Flemish school was at Antwerp, where Quinten Matsys (died 1530) founded a school, which in the seventeenth century found its culmination in Rubens (1577–1640) and his pupils Van Dyck and Jordaens. The productions of the later Flemish school are characterized by brilliant line and color, though they are materialistic and lack beauty of form and tenderness of feeling. Although Flemish as regards its characteristic realism, it was much influenced by Italian painting, especially in color. Contemporary with Rubens and his followers were a number of important genre painters, who were thoroughly Flemish, untouched by Italian influence. The chief representatives were Teniers the Younger, Brouwer, and Gonzales Coques. In the eighteenth century Flemish painting declined and was of little importance.

The painting of the early Dutch school resembles that of the Flemish and was much influenced by the Van Eycks. Haarlem is recorded as being the chief centre, but none of the works of the reputed founder of the school, Aelbert Ouwater (fifteenth century), survive. Its chief masters were Dierick Bouts (died 1475) and Lucas van Leyden (1494–1533). The sixteenth century was a period of Italian influence and unimportant productions, but the seventeenth was the golden age of Dutch painting. Haarlem remained the chief centre, and there was an important school at Amsterdam. With an entire absence of Italian influence there arose an art more realistic, more distinctly national than the Flemish. The overthrow of Spain and Catholicism did away with the demand for religious paintings, and the more specialized modern forms—portrait, genre, landscape, animal, and still life—arose. In these the Dutch achieved a high degree of perfection alike in color and design, but they seldom attempted larger compositions, in which they were indifferently successful. Among the Dutch painters of the seventeenth century the chief masters in portraiture are Frans Hals and Rembrandt; the latter was equally great in landscape and introduced light effects which have not yet ceased to influence painting. In genre painting the most important were Adriaen van Ostade for peasant scenes and Gerard Terburg for more refined subjects, besides Gerard Dou, Jan Steen, Pieter de Hooghe, and Jan van der Meer. The Dutch were the first to practice landscape and animal painting for its own sake; their greatest landscapists were Jacob van Ruysdael and Hobbema, while in animal painting Wouverman, Paul Potter, Adriaen van de Velde, and Albert Cuyp are preëminent. In marines the greatest names are Willem van de Velde the Younger and Backhuisen, and in all the branches of still-life painting the Dutch excelled predecessors and contemporaries. In the nineteenth century a new school, distinctly Dutch, arose, including important artists like Israels, the peasant painter, the brothers Maris in landscape, Mesdag in marines, and Mauve in animal subjects.

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of the Nineteenth Century (Philadelphia, 1908); C. H. Caffin, *Story of Dutch Painting* (New York, 1911).

NETH'ERSOLE, Olga (1870–). An English actress and manager, born in London. She made her London début in 1888 and during the nineties was manager of several London theatres. In 1894 she came to America, where she soon became well known in *Camille, Carmen, Sapho,* and especially for her Paula in A. W. Pinero's *The Second Mrs. Tanqueray* (1899). In 1902 her performance in New York in *Sapho* provoked such bitter criticism upon the grounds of its impropriety that she canceled her engagements and returned to London, where she appeared in *The Flute of Pan* in 1904 and in *The Labyrinth* in 1905. Two years later, under her own management, she starred in a repertoire of her successes at the Théâtre Sarah Bernhardt in Paris. She returned to the United States again in 1910 and appeared at the New Theatre, New York, in Maeterlinck's *Mary Magdalene.* In 1911 she played the title rôle in *Sister Beatrice* (San Francisco) and in 1912 Helena in *The Awakening of Helena Ritchie* (Birmingham, England). Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

NETHINIM, nĕ'thē-nĕm' (Heb., given [to God], from *nāthan,* to give, a late Aramaicizing form of the passive participle *nethunim*). The lowest order of ministers of the temple at Jerusalem, mentioned only in Chronicles and Ezra-Nehemiah. They are distinguished from the Levites, but were of sufficient importance to make Ezra solicitous for a large following of them with his mission to Jerusalem (Ezra viii. 17–20). They enjoyed the immunities of the priesthood (vii. 24), possessed a distinct quarter on the temple hill, along with allotments in the towns (Neh. iii. 31; Ezra ii. 70), and shared in the civic life of Israel (Neh. x. 28). Their name, along with their subordinate position, shows that the caste originally consisted of slaves piously devoted to the sanctuary, like the Greek hierodules, to perform its menial duties. The tradition is preserved that David and his princes "gave" these servants (Ezra viii. 20), one division of them being associated with Solomon (ii. 55). The large number of foreign names among the Nethinim suggests that they were largely drafted from prisoners of war (cf. Josh. ix. 23). Such foreign slaves seem to have been employed in the temple down to the time of the exile at least (Ezek. xliv. 6 f.). After a time they were so completely established as a sacred official class that various privileges were accorded to them. They shared with priests, Levites, singers, and porters immunity from taxation (Ezra vii. 24), lived in a special quarter near the water gate (Neh. iii. 26), and joined as full members of the community in the oath not to allow their children to marry foreigners (Neh. x. 28 ff.). But time broke down the racial distinction. The Talmud, with its often abstract view of history, outlaws them as heathen, but this view is contradicted by the Bible. Consult: Baudissin, *Die Geschichte des alttestamentlichen Priesterthums untersucht* (Leipzig, 1899); H. E. Ryle, "Nehemiah," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1893); Joseph Jacobs, *Studies in Biblical Archæology* (London, 1894); A. H. McNeile, in Hastings and Selbie, *Dictionary of the Bible* (New York, 1909).

NÉTHOU, nā'tōō', Pic de. The highest peak of the Pyrenees. It is situated in the Spanish Province of Huesca, immediately south of the French boundary, 40 miles west of Andorra (Map: Spain, F 1). Its height is 11,169 feet, and it forms with the neighboring Pic de la Maladetta (10,867 feet) and Pic du Milieu (11,010 feet) the Maladetta group, a steep and jagged granite mass. On its north slope lies an extensive glacier. The summit is often ascended for the splendid view which it affords.

NETLEY MEDICAL SCHOOL. See Medical School, Netley.

NETS (AS. *net,* Goth. *nati,* OHG. *nezzi,* Ger. *Netz*). Openwork fabrics, with regular mesh, made by knotting, plaiting, twisting, or weaving, out of linen, cotton, hemp, silk, wire, and other materials. Net making is one of the primitive arts. In the South Sea islands, the natives when first discovered by Europeans, though entirely ignorant of weaving, were skillful in the knotting of nets for catching fish, birds, and animals. In ancient Assyria, Egypt, Greece, and Rome hunting nets were in common use, as is shown by sculptural reliefs and paintings and by literary evidence. The finest and most delicate of nets are those made by hand with needle or bobbin and by lace machines in imitation of them. These are lace nets. (See Lace.) They are sometimes used plain, often with inserted or appliqué motifs and edgings of hand or machine lace. The meshes of hair nets and veils are particularly large and open. The principal use for coarse and heavy fabric nets to-day is to catch fish, the stationary nets being called seines, the dragged ones trawls. Wire net (or netting, as it is often called) is frequently employed to fence in domestic fowls and small animals and has almost superseded cotton as a material for mosquito net. See Trapping.

NETSCHER, nĕt'shĕr, Kaspar (1639–84). A Dutch genre and portrait painter, born at Heidelberg. He studied under Herman Koster at Arnheim and later under Gerard ter Borch at Deventer. After a visit to France he took up his residence at The Hague in 1662. His best work is in portraiture on a small scale and in small genre subjects. Netscher belongs to the commencement of the period of decadence in Dutch art and is lacking in intellectuality, but in his best period is distinguished for the elegance and grace of his figures, especially of women and children, his mellow, golden tone, and his skill in painting textures, particularly white satin. The Dresden Gallery is rich in good pictures by him. They include: "Man Writing a Letter" (1665); "Lady with a Spaniel"; "Lady at the Piano"; two portraits of Madame de Montespan. The National Gallery, London, has his "Lady at a Spinning Wheel" and "Children Blowing Bubbles"; the Louvre, his "Singing Lesson" and "Violoncello Lesson"; the Metropolitan Museum, New York, the "Portrait of a Dutch Lady" and "A Card Party"; and the Boston Museum, his "Boy and Girl Blowing Bubbles." The Rijks-Museum, Amsterdam, possesses 16 portraits, and several of his best works are in private collections in England. He also painted historical subjects, but with less success. His two sons, Constantyn (1668–1723) and Theodorus (1660–1732), were also portrait and genre painters.

NETSUKE, nĕt's'-kā' (from Jap. *ne,* wood, root + *tsuké,* to suspend). A button of wood, crystal, or porcelain, but usually of ivory, by which the Japanese smoker suspends his outfit

of tobacco, flint and steel, pipe, etc., from his girdle. Often the netsuké is elaborately carved and is among the most characteristic products of native skill. The best specimens are valued by both native and foreign collectors. Consult: M. B. Huish, "The Evolution of a Netsuke," in *Transactions and Proceedings of Japan Society of London*, vol. iii (London, 1897); R. Graul, "Netsuke," in *Kunstgewerbeblatt*, vol. xvii (N. S., Leipzig, 1905); A. Brockhaus, *Netsuké: Versuch einer Geschichte der japanischen Schnitzkunst* (ib., 1905).

NETTEMENT, nĕt'mäN', Alfred François (1805–69). A French journalist and historian, born in Paris. He early began to contribute to the magazines and was a consistent Catholic in religion and a legitimist in politics. In 1848 he founded the review *L'Opinion Publique* and in it expressed his own opinions so forcibly that, after the coup d'état of 1851, the paper was suppressed and Nettement imprisoned. Among his works are: *Histoire de la Révolution de juillet* (1833); *Histoire de la littérature française sous la Restauration* (1852); *Histoire de la littérature française sous la royauté de juillet* (1854); *Histoire de la Restauration* (1860–68); *Etudes critiques sur le feuilleton roman* (1845–46); *Vie de madame la marquise de la Roche-jacquelin* (1858).

NET'TER, Thomas, also called Waldensis, from his birthplace, Saffron Walden, Essex (c.1375–1430). An English Carmelite monk. He studied at Oxford and rose to eminence as a man of learning and business capacity. He was elected provincial prior of the English Carmelites in 1414 and was confessor to Henry V and to Henry VI. He was the King's representative at the Council of Constance and was sent on an embassy to Poland, Lithuania, and Prussia. He died at Rouen, France, whence he had accompanied the King, Nov. 2, 1430. He threw himself with great ardor into the lists against the Lollards and so won the sobriquet of Prince of Controversialists. His chief writings against them are *Doctrinale Fidei Ecclesiæ Catholicæ contra Wiclevistas et Hussitas* and, especially valuable for its documents, *Fasciculi Zizaniorum Johannis Wyclif* (ed. by Shirley, London, 1858).

NET'TLE (AS. *netele, netle*, OHG. *nezzila, nezila*, dim. of *nazza*, nettle, Ger. *Nessel*, Ir. *nenaid*, nettle, probably connected with OPrus. *noatis*, Lith. *noterē*, Lett. *nâtres*, Gk. *ἀδίκη, adikē*, nettle). A common name of *Urtica*, a genus of plants of the family Urticaceæ having unisexual flowers. The species are annual or perennial herbs with occasionally shrubby bases, many of them covered with stinging hairs, which emit an acrid juice and pierce the skin when touched, often causing much inflammation and pain; when grasped in such a way as to press the hairs to the stem, no stinging ensues. The species of a number of distinct genera were formerly included in the genus, especially those having stinging hairs, as *Laportea, Pipturus*, and *Pouzolzia*. Some of these are shrubs or even trees, the giant nettle tree of Australia attaining great size. The sting of East Indian species is much more severe than that of European and American species. *Urtica crenulata*, or *Laportea crenulata*, is said to produce a sensation similar to the continual application of a hot iron. The roots of nettles, boiled in alum, afford a yellow dye, and the juice of the stalk and leaves has been used to dye woolen stuffs a beautiful and permanent green. The small nettle (*Urtica urens*) and the great nettle (*Urtica dioica*), introduced European species, are abundant in America. Whatever gives nettles their stinging power is dissipated by boiling Their high value as food for swine, poultry, and particularly for turkeys, is well known to the peasantry of many countries; the great nettle is cultivated in Sweden for fodder. The seeds are fed to poultry. The stalks and leaves of nettles are employed in some parts of England for the manufacture of a light kind of beer, called nettle beer. The bast fibre of nettles is used for textile purposes. Yarn and cloth, both of the coarsest and finest descriptions, can be made of it. The fibre of *Urtica dioica*, used by the ancient Egyptians, is still employed in Piedmont and other countries. When wanted for fibre, the plant is cut in midsummer and treated like hemp. The names "nettle yarn" and "nettle cloth" are, however, now commonly given in most parts of Europe to particular linen and cotton fabrics. The fibre of *Urtica cannabina*, a native of the south of Siberia and other middle parts of Asia, is much used, and from other species both fine lace and strong ropes can be manufactured. The fibre of *Urtica japonica*, or *Pouzolzia viminea*, is much used in Japan, and also that of *Urtica argentea*, or *Pipturus argenteus*, in the South Sea islands, and of *Urtica gracilis* in Canada. *Urtica tuberosa*, or *Pouzolzia tuberosa*, produces nutritious tubers, which are eaten in India raw, boiled, or roasted. Australia produces a magnificent tree nettle, *Laportea gigas*, abundant in some parts of New South Wales, which sometimes reaches a height of 140 feet, with a trunk of great thickness and very large green leaves which, when young, sting violently. In some places it forms scrub forests, and its stinging leaves form a great impediment to the traveler. The common nettle tree of the United States is a species of *Celtis* (see Hackberry); the name "dead nettle" is given to certain species of *Lamium*, a genus of the family Labiatæ. *Bœhmeria nivea*, often called false nettle, supplies China grass or ramie (q.v.).

NETTLE BUTTERFLY. Any of several species of butterflies whose eggs are laid upon the leaves of nettles, viz., *Pyrameis atalanta, Pyrameis cardui*, and *Vanessa urticæ*, the last, as its scientific name shows, being an especial frequenter of these plants. The two former are cosmopolitan, while the *Vanessa* is European.

NETTLE FAMILY. A family of plants. See Urticaceæ.

NETTLE RASH. See Hives; Urticaria.

NET'TLESHIP, Henry (1839–93). An English classical scholar, born in Kettering, Northamptonshire. He was educated at the Cathedral School, Durham, Charterhouse, and Oxford, where he was elected fellow of Lincoln and gained the Chancellor's Latin Essay prize. From 1868 to 1873 he was assistant master at Harrow. In 1870 he married the eldest daughter of Rev. T. H. Steel, his colleague at Harrow. In 1873 he was appointed fellow and tutor of Corpus Christi College and classical lecturer at Christ Church, Oxford, which appointments he resigned on being made Corpus professor of Latin literature in the University of Oxford in 1878. He published and edited many classical works, among them a commentary on *Æneid*, x, xii, a revised edition of Conington's *Vergil* (1883), and revisions of Conington's edition and translation, in prose, of Persius (1874, 1893);

Lectures and Essays on Subjects Connected with Latin Literature and Scholarship, two series (1885, 1895); *Contributions to Latin Lexicography* (1889). With J. E. Sandys he revised and edited, in translation, O. Seyffert's *A Dictionary of Classical Antiquities, Mythology, Religion, Literature and Art* (London, 1891). For a memoir by his wife and a bibliography, consult his *Lectures and Essays, Second Series* (Oxford, 1895).

NETTLESHIP, Richard Lewis (1846–92). An English philosopher. He was born at Kettering and was educated at Uppingham and at Balliol College, Oxford, where he won many university distinctions. There he became a fellow in 1869, and later as tutor he took the place of Thomas Hill Green in the teaching of philosophy at Balliol. He edited the works of Green with a valuable memoir in 1880. Though he made a lasting impression in his own circle at Oxford, he published only a single essay, *The Theory of Education in Plato's Republic* (1880; new ed., 1906). After his death there appeared *Philosophical Lectures and Remains of Richard Lewis Nettleship*, with a biographical sketch (2 vols., 1897; 2d ed., 1901), edited by A. C. Bradley and G. R. Benson.

NET'TLETON, Alfred Bayard (1838–1911). An American soldier, journalist, and public official, born at Berlin, Delaware Co., Ohio. He studied at Oberlin College, but at the outbreak of the Civil War enlisted as a private in the Federal army and before the conclusion of peace rose to the rank of colonel of the Second Ohio Cavalry (volunteers) and brevet brigadier general. He then studied law, but afterward did newspaper work in Sandusky, Ohio, Chicago, Philadelphia, and Minneapolis. From 1870 to 1875 he was actively interested in the construction of the Northern Pacific Railroad and for the next five years in various mining and manufacturing enterprises. He was Assistant Secretary of the United States Treasury from 1890 to 1893 and for a short time after Secretary Windom's death served as Secretary.

NETTLETON, Walter (1861–). An American landscape painter. He was born at New Haven, Conn., and graduated from Yale in 1883. His professional training was acquired at the Yale School of Fine Arts, the Art Students' League, New York, and in Paris under Carolus Duran, Alexander Harrison, and others. After 1889 he exhibited frequently at the Salon and also at the important American exhibitions, including those of the Pennsylvania Academy of Fine Arts, Philadelphia, and the National Academy of Design, New York. In 1905 he was elected an associate of the Academy. He received a gold medal at the Society of American Artists, Philadelphia, in 1907. Nettleton is especially known for his Brittany scenes, and for his later work in winter landscapes of the country about Stockbridge, Mass., where he made his home. They display a sure technique, rich harmonious color, and a sincere if somewhat solid treatment. The snow scenes are particularly fine. Some of his works in public collections are: "December Sunshine," Yale Art Museum, and "The Beloved Physician," Jackson Library, Stockbridge, Mass.

NETTLE TREE. American ornamental trees and shrubs of the family Urticaceæ, known by sundry popular names, as hackberry (q.v.).

NEUBAUER, noi'bou-ĕr, Adolf (1832–1907). An English Semitic scholar, born in Hungary and educated at Prague, Munich, and Paris. In 1868 he went to Oxford, where he catalogued the Hebrew manuscripts in the Bodleian Library, of which he was subsequently sublibrarian (1873–99). He was reader of Rabbinical literature to the university in 1886–1900. Neubauer published: *Mediæval Jewish Chronicles and Chronological Notes*, in the Semitic Series of the "Anecdota Oxoniensia"; *Histoire de la lexicographie hébraïque* (1861–62); *Géographie du Talmud* (1868); *The Book of Hebrew Roots* (1875); *The Book of Tobit* (1878); *Catalogue of Hebrew Manuscripts in the Bodleian Library* (1886); *On the Dialects Spoken in Palestine at the Time of Christ* (1888).

NEUBER, noi'bĕr, Friederike Karoline (1697–1760). A German actress. She was born in Reichenbach, and her maiden name was Weissenborn. From the undue restraint of her father's house she fled in 1718 with her lover, Neuber, to Weissenfels, where they joined some strolling comedians. Seven years afterward, with another company which she had entirely reorganized, she appeared at Leipzig. Meeting Gottsched, she became a convert to his gospel of French classical methods. In 1737 she presented the play *Vertreibung und Tod des Hanswurst*. A short tour to St. Petersburg (1740) seems to have been the turning point in her career. She quarreled with Gottsched on her return, lost her company twice, and failed in her attempt to rehabilitate her fortunes as an actress in Vienna, Dresden, and elsewhere. Consult the biography by Von Reden-Esbeck (Leipzig, 1881).

NEUBRANDENBURG, noi-brän'den-burk. A town in the Grand Duchy of Mecklenburg-Strelitz, Germany, near the head of Lake Tollense, 16 miles northeast of Neustrelitz (Map: Germany, E 2). Its old walls, still standing, and its four handsome Gothic gates give the town a mediæval appearance. The Gothic church of St. Mary dates from the thirteenth century. Near by is the grand ducal palace of Belvedere. It has a museum of antiquities, a Gymnasium, a Realschule, and an art gallery. There are manufactures of machines, pianos, paper, lumber, dairy produce, and brandy, as well as an important trade in grain and horses. Pop., 1910, 12,348. Neubrandenburg was founded in 1248 by Margrave John I of Brandenburg.

NEU'BURGER, Max (1868–). An Austrian neurologist and historian of medicine, born at Vienna and educated there (M.D., 1893), especially under Puschmann. He settled in the Austrian capital and after 1898 was connected with the university as lecturer on the history of medicine and as assistant professor (after 1904). Neuburger wrote on neurology, but his chief work (written with Pagel, q.v.) is the standard *Handbuch der Geschichte der Medizin* (3 vols., 1903–05). Under the direction of Sir William Osler it was translated into English by Ernest Playfair as *History of Medicine* (1910 et seq.).

NEUCHÂTEL, nē'shâ'tĕl', or **NEUFCHÂTEL.** The capital of the canton of the same name in Switzerland, situated on the Lake of Neuchâtel, 25 miles west of Bern (Map: Switzerland, A 2). It is a well-built town, with a picturesque location on a slope 1425–1900 feet above the sea. It has fine public buildings. A beautiful avenue extends along the water front, and one of the squares is adorned with a statue of the Neuchâtel merchant, David de Purry, to

whose generosity the town owes many of its institutions. The twelfth-century abbey church contains a fine monument, erected in 1372, to the counts of Neuchâtel. The old château is now the seat of the cantonal government. Neuchâtel's institutions include the University of Neuchâtel with faculties of letters, science, theology, and law, a valuable natural-history collection, a commercial school, a Gymnasium, an observatory, a museum of natural history, an historical and ethnographical museum, a museum of fine arts, and a public library of 100,000 volumes. There are a number of private boarding schools, attended mostly by foreigners. The industries of Neuchâtel include the manufacturing of watches, electrical apparatus, and jewelry. The trade is of some importance. Pop., 1900, 20,843; 1910, 23,505, chiefly French Protestants. For history, see the article on the Canton of Neuchâtel. Consult August Bachelin, "Neuchâtel and its Environs," in *Europe Illustrated* (Zurich, 1883), and E. Quartier-La-Tente, *Les rues et les édifices de la ville de Neuchâtel* (Neuchâtel, 1897).

NEUCHÂTEL, or **NEUFCHÂTEL** (Ger. *Neuenburg*). A western canton of Switzerland, bounded on the north by the Canton of Bern, on the east by the Canton of Bern and the Lake of Neuchâtel, on the south by the Canton of Vaud, and on the west by the French Department of Doubs. Area, 312 square miles (Map: Switzerland, A 1). The whole country belongs to the region of the Jura and is generally divided into three parts: the region along the lake, ranging in altitude from about 1400 to over 2000 feet and famous for its vineyards; the central portion, traversed by two valleys with an average altitude of 3200 feet and producing principally cereals; and the forest region of the west, devoted chiefly to pastoral purposes. The highest point is the Creud du Van (4800 feet). Hydrographically the canton belongs partly to the Aare and partly to the Doubs. The principal minerals are asphalt, cement, and building stones. Besides agriculture and stock raising, the fundamental industries of the canton, the inhabitants are engaged in watchmaking, distilling, and in manufacturing cables, electrical apparatus, paper, and chocolate. The canton is well known for its sparkling wine and absinthe. The constitution originally adopted in 1858 provides for a grand council elected directly for three years at the rate of one member to every 1200 inhabitants. The five members of the executive council have been elected triennially since 1906. The referendum was adopted in 1879, and the initiative in 1882. For the administration of justice there are a number of justices of the peace, several industrial arbitration courts, and a court of appeals at Neuchâtel. The canton is represented by six members in the National Council. For administrative purposes Neuchâtel is divided into six districts. Pop., 1900, 126,279; 1910, 132,184, mostly French Protestants. Capital, Neuchâtel (q.v.).

The mediæval countship of Neuchâtel passed in 1504 to the house of Orléans-Longueville. In 1707, on the extinction of the Neuchâtel branch of the latter family, 15 claimants came forward, among them Frederick I, of Prussia, whose mother was a princess of the house of Orange, which was connected by descent with the house of Châlons, to whose overlordship Rudolph of Hapsburg had subjected Neuchâtel in 1288. Frederick I was the successful candidate; and from his time Neuchâtel continued associated with Prussia till 1806, when Napoleon bestowed it upon General Berthier. In 1814 it was restored to the house of Brandenburg and in the same year became a member of the Swiss Confederacy. It became a Republic in 1848. Its connection with the Prussian monarchy has been dissolved since 1857.

Consult: L. Grandpierre, *Histoire du canton de Neuchâtel sous les rois de Prusse* (Leipzig, 1889); E. Quartier-la-Tente, *Le canton de Neuchâtel: revue historique et monographique* (Neuchâtel, 1895); Numa Droz, *La république neuchâteloise, ses origines et son développement* (Paris, 1899); Diacon and Rousselot, *Guide du canton de Neuchâtel* (2d ed., ib., 1902); A. Pfleg, *Die schweizerische Uhrindustrie* (Leipzig, 1908).

NEUCHÂTEL, Lake of (Ger. *Neuenburger See*). A lake in the western part of Switzerland lying along the east base of the Jura Range, 19 miles north of the Lake of Geneva (Map: Switzerland, A 2). It is 24 miles long and from 2 to 5 miles wide, being the third largest lake of Switzerland. Its shores, which are very little indented, are partly low and marshy, partly hilly, and covered with forests or vineyards. Successive drainage has brought to light the remains of many lake dwellers. The lake may be considered as an expansion of the river Thièle, which enters at the south end, and leaves it at the north on its way to the Aare. It was an important commercial route until railroads were built along its banks, and is traversed by regular lines of steamers between the towns of Neuchâtel and Estavayer.

NEUDÖRFER, noi'dĕr-fĕr, Johann Georg (1497–1563). A German writing master and calligrapher, born at Nuremberg. He became the foremost representative of his profession, which, despite the invention of printing, was still widely and skillfully practiced and highly esteemed. His manuscripts were beautifully decorated with gold and other colors, but his chief attention was directed towards an elegant formation of the letters of the German alphabet. He thus developed the German Gothic characters to their perfection and secured their general use. Of his autographs there are known to exist only the signatures to the Gärtner copies of Dürer's two paintings, "The Temperaments" (in the Germanic Museum, Nuremberg), and a letter of June 7, 1556 (in the municipal archives of Nuremberg). He also wrote in 1547 the *Nachrichten von nürnbergischen Künstlern und Werkleuten daselbst* (new ed. by Lochner, Vienna, 1875), whose 79 brief notices are important sources regarding the history of Nuremberg of the early sixteenth century.

NEUENDORFF, noi'en-dôrf, Adolf (1843–97). A German-American musician, conductor, and operatic impresario. He was born in Hamburg, Germany, but at the age of 12 came to America, where he completed his musical education. He first came before the public in 1859 as a concert pianist, and in 1860 became the solo violin in the Stadt Theater orchestra of New York. The following year he toured Brazil, and on his return was appointed musical director of the German Theatre in Milwaukee, Wis. To him is due the credit of introducing Wagner's *Lohengrin* into the United States, at the Stadt Theater, New York (1871). He also introduced

Wachtel (the famous tenor), and the following year (1872) conducted the season of grand opera at the Academy of Music (New York). *Die Walküre* also received its first presentation in this country at his hands (1877), and in 1878 he was appointed conductor of the New York Philharmonic Society. From 1884 to 1889 he was a concert director in Boston, after which he became associated with the management of several successful opera companies. His wife, Georgine von Januschowsky (1859–1914), was prima donna of the Imperial Opera, Vienna, in which city he spent two years (1893–95), returning in 1896 to become musical director of the Hebrew Temple Emanu-El. In 1897 he conducted the Metropolitan Orchestra. He composed operas, symphonies, overtures, and many songs.

NEUENKIRCHEN, noi'en-kĕrk'en. A town of Austria. See NEUNKIRCHEN.

NEUFCHÂTEAU, nē'shà'tō', COUNT FRANÇOIS DE. See FRANÇOIS DE NEUFCHÂTEAU.

NEUFCHÂTEL, nē'shà'tĕl'. See NEUCHÂTEL.

NEUFVILLE, FRANÇOIS DE. See VILLEROI, DUKE DE.

NEUHAUS, noi'hous. A town of Bohemia situated 70 miles south-southeast of Prague (Map: Austria, D 2). It contains a mediæval castle with a fine gallery of paintings, a thirteenth-century Gothic parish church, a Franciscan monastery, a museum, and a college. Manufactures include silk, cotton and woolen goods, embroidery, lace, starch, sirup, lumber, beer, and brandy. Pop. (district), 1910, 52,409.

NEUHÄUSEL, noi'hoi-zel (Hung. *Ersekújvár*). A town in the County of Neutra, Hungary, situated on the Neutra, 55 miles northwest of Budapest (Map: Hungary, F 2). It has a fine church, a Franciscan monastery, and a Gymnasium. There are manufactures of textiles and shoes, and the town is a good grain and horse market. Prior to 1724 it was a strong fortress and played a prominent part in the Turkish wars. Pop. (district), 1910, 34,442, mostly Catholic Magyars.

NEUHOF, noi'hŏf, THEODOR STEPHAN VON, BARON (c.1686–1756). A German adventurer and King of Corsica. He was born in Metz, the son of a Westphalian nobleman in the French service, and became page to the Duchess of Orléans. He then enlisted in the French army and later in the army of Sweden, where the Minister Goertz discovered him and employed him on secret diplomatic missions. In Spain he married a daughter of Lord Kilmallock and ran away with her diamonds to France. Beggared by Law's financial schemes, he lived in misery till 1732, when the Emperor Charles VI made him chargé d'affaires at Florence. In Florence Neuhof rendered some service to several Corsican patriots, who in return invited him to become King of Corsica. He landed in Corsica in March, 1736, was proclaimed King as Theodore I, and with help obtained from the Dey of Algiers defeated the Genoese. He left the island soon to seek assistance abroad, and came back in 1738 with reënforcements from Holland. But the French had come to the aid of the Genoese, and Neuhof fled. He made one more attempt on Corsica in 1743, but failed, and after long wandering went to England in 1749. There he was thrown into prison by his creditors and was released through the intercessions of Horace Walpole. Neuhof's son published his life in *Mémoires pour servir à l'histoire de Corse* (1768). Consult Fitzgerald, *King Theodore of Corsica* (London, 1890).

NEUHUYS, nē'hois, ALBERT (1844–1914). A Dutch genre painter, born in Utrecht. He studied under Craeyvanger and at the Antwerp Academy, and started as an historical and portrait painter, but after 1870 turned to interiors. When Israels had ceased to paint, Neuhuys became the most distinguished of the Dutch artists devoted to the portrayal of peasant life. His cottage pictures possess much the same characteristics as those of Israels, but in their rich, refined color scheme and admirable handling of lights and shadows bear more resemblance to Jacob Maris. They are to be found in many galleries and private collections in Europe and America. The Metropolitan Museum, New York, has one of his typical Dutch interiors, the Rijks-Museum two, the Dordrecht Museum one. He was awarded gold medals at Munich, Vienna, Paris, and Chicago. His home was in Amsterdam.

NEUILLY, nē'yē'. A northwest suburban municipality of Paris, in the Department of Seine, on the right bank of the river Seine (Map: Paris and vicinity). It is a favorite residential section of Parisian merchants and has sanatoriums, hospitals, and five parks, and, in connection with Parisian houses, establishments manufacturing patent leather, carpets, chemicals, perfumery, dyes, chocolate, varnish, starch, and automobiles. In a large and beautiful park along the Seine formerly stood the Château de Neuilly, built by Louis XV, and the favorite residence of Louis Philippe, who after his deposition assumed the title of Count of Neuilly. The château was destroyed in the revolution of 1848. Pop., 1901, 37,493; 1911, 44,616.

NEUKOMM, noi'kŏm, SIGISMUND VON (1778–1858). An Austrian composer and orchestra leader, born at Salzburg. He studied under Weissauer the organist and Michael and Joseph Haydn, the latter of whom was mainly instrumental (in 1804) in securing for Neukomm the leadership of the German opera at St. Petersburg. In 1809 he went to Paris, where he gained the friendship of Grétry, Cherubini, and Talleyrand, and in 1815 received the cross of the Legion of Honor. In 1816 he went to Rio de Janeiro and was appointed music teacher to the Crown Prinee Dom Pedro. He returned in 1821. He was a prolific composer and has nearly 300 compositions to his credit. Of these his sacred works continued to enjoy great popularity for some time after his death, which occurred in Paris.

NEUMANN, noi'mân, ANGELO (1838–1910). An Austrian operatic impresario, born in Vienna. After 1859 he sang tenor parts in the opera at Cracow, Odenburg, and Pressburg; was a member of the Vienna Royal Opera in 1862–76; and in the latter year became director of the opera at Leipzig. The success of his presentation of Wagner's *Der Ring des Nibelungen* in Berlin and in London led him to establish in 1882 a traveling Wagnerian company, with which he toured Europe. At the end of 1882 he assumed direction of the Stadttheater at Bremen, and after 1885 was director of the German Landestheater at Prague. Neumann is author of *Erinnerungen an Richard Wagner* (1907; 4th ed., 1908; Eng. trans. by E. Livermore, *Personal Recollections of Wagner*, 1909).

NEUMANN, FRANZ ERNST (1798–1895). A

German physicist, born at Joachimsthal, near Berlin. He took part in the War of 1815 and afterward studied at the universities of Jena and Berlin. Neumann received his doctor's degree in 1826, and in 1828 he was made professor of physics and mineralogy in the University of Königsberg. He contributed to the theories of the reflection and refraction of light and of double refraction, to the study of crystals of double axes, and to the methods of determining the specific heat of bodies. From his work on specific heat he established (1831) Neumann's law, that the molecular heat of a compound is equal to the sum of the atomic heats of its constituents. Neumann's chief publications are: *Vorlesungen über die Theorie des Magnetismus* (1881); *Einleitung in die theoretische Physik* (1883); *Vorlesungen über elektrische Ströme* (1884); *Vorlesungen über theoretische Optik* (1885); *Vorlesungen über Theorie des Potentials* (1887); *Ueber ein allgemeines Princip der mathematischen Theorie inducirter elektrischer Ströme* (1892). About 100 of his memoirs appeared in the *Annalen, Crelle's Journal,* and the *Astronomische Nachrichten.* Consult Volkmann, *Franz Neumann* (Leipzig, 1896).

NEUMANN, Karl Friedrich (1793–1870). A German Orientalist and historian, born at Reichmannsdorf, Bavaria. He was educated at the universities of Heidelberg, Munich, and Göttingen, in 1821–25 was an instructor in the Gymnasium at Speyer; and later, at the Mechitarist cloister and academy on the island of San Lazzaro, Venice, made a study of the Armenian language and literature, some results of which appeared in his *Geschichte der armenischen Litteratur* (1836). He also made several translations into English of Armenian chronicles for the Oriental Translation Fund of London. During a visit to China he acquired an extensive knowledge of the Chinese tongue and a library of 12,000 printed books, which he presented to the Bavarian government. In 1833 he was appointed at Munich professor of the Armenian and Chinese languages, but in 1852 was retired because of his expression of liberal political views. He further wrote several works on the history of the Far East, a *Geschichte des englischen Reichs in Asien* (1857), and a *Geschichte der Vereinigten Staaten von Amerika* (1863–66).

NEUMANN, Karl Gottfried (1832–). A German mathematician, son of Franz Ernst Neumann, the physicist. He was born and educated in Königsberg, was professor at Halle, Basel, and Tübingen, and in 1868 became professor at Leipzig, founding in the same year the *Mathematische Annalen.* He retired in 1911. Neumann devoted himself mainly to the theory of functions and to mathematical physics, and may be considered the founder of the theory of logarithmic potential. Neumann edited various papers written by his father and published: *Theorie der Besselschen Funktionen* (1867); *Ueber die elektrischen Kräfte* (1873, 1898); *Vorlesungen über die mechanische Theorie der Wärme* (1875); *Untersuchungen über das logarithmische und Newtonsche Potential* (1877); *Hydrodynamische Untersuchungen* (1883); *Vorlesungen über Riemanns Theorie der Abelschen Integrale* (1884); *Allgemeine Untersuchungen über das Newtonsche Princip der Fernwirkungen* (1896).

NEUMANN, Karl Johannes (1857–). A German classical scholar, born at Glogowo and educated at Strassburg, where he later became professor of ancient history. His numerous publications include: *Juliani Imperatoris Librorum contra Christianos quæ Supersunt* (1880); *Strabons Landeskunde von Kaukasien* (1883); *Julians Abfall von Christentum* (1884); *Der römische Staat und die allgemeine Kirche bis auf Diocletian* (1890); *L. Junius Brutus der erste Konsul* (1901); *Die hellenistischen Staaten und die römische Republik* (1909); *Römische Staatsaltertümer* (1911; 2d ed., 1913).

NEUMANN-SPALLART, späl'lärt, Franz Xaver von (1837–88). An Austrian economist, born and educated in Vienna. He was professor of economics there in the commercial academy (1864–68), at the military academy (1868–71), and at the university and the agricultural college (1872). With Bodio he was one of those most influential in forming the International Statistical Institute, and he was long connected with the Austrian Central Commission on Statistics. As an economist he was a zealous worker in the interest of free trade in Austria and founded the Association for Economic Progress. Neumann published: *Oesterreichs Handelspolitik* (1864); *Volkswirtschaftslehre mit besonderer Anwendung auf Heerwesen und Militärverwaltung* (1873); and the valuable yearbook *Uebersichten in der Weltwirtschaft* (1878–87), continued by Juraschek.

NEUMARK, noi'märk, Georg (1621–81). A German poet. He was born at Langensalza and studied at Königsberg. At Kiel, where, after wandering about in poverty, he was engaged as a tutor, he wrote his famous song "Wer nur den lieben Gott lässt walten." Neumark was a member of the poetical guild called the Palmenorden, and he wrote its history, *Der neusprossende deutsche Palmbaum* (1668). Consult the selected poems in M. Müller, *Bibliothek deutscher Dichter des 17. Jahrhunderts,* vol. ii (Leipzig, 1828, and Knauth, *Georg Neumark nach Leben und Dichten* (Langensalza, 1881).

NEUMAYER, noi'mī-ēr, Georg von (1826–1909). A German meteorologist and hydrographer, born at Kirchheimbolanden, Bavaria. He was educated at the Polytechnic and the University of Munich and at the nautical school at Hamburg, and in 1857 was sent by Maximilian II to Australia to make magnetic observations. At Melbourne Neumayer founded the Flagstaff Observatory. He returned to Germany in 1864, interested himself in the formation of expeditions to the north and south poles and in founding the German African Company, and, after a long connection with the hydrographic bureau at Berlin, in 1876 became director of the German Marine Observatory at Hamburg. He held this position until 1903, when he retired. Neumayer wrote: *Results of the Observations at the Flagstaff Observatory* (1858–63) and *Results of the Magnetic Survey of Victoria* (1869); *Anleitung zu wissenschaftlichen Beobachtungen auf Reisen* (1875; 3d ed., 1905); *Beobachtungsergebnisse der deutschen Stationen im Systeme der internationalen Polarforschung* (1886), with Börgen; *Die deutsche Expedition und ihre Ergebnisse* (1890–91); *Atlas des Erdmagnetismus* (1891); *Anemometer-Studien* (1897); *Auf zum Südpol!* (1901).

NEUMAYR, noi'mīr, Melchior (1845–90). An Austrian geologist. He was born in Munich, studied there and at Heidelberg, where, after four years in the Imperial Geological Institute at Vienna, he became docent in 1872. He soon re-

turned to Vienna and became full professor of geology and paleontology in 1880. Neumayr traveled widely in southern Europe and Asia Minor, making an especial study of the life and coördination of the Jurassic formations, the results of which appeared in the German geological magazines. He coöperated on *Geologische Studien in den Küstenländern des griechischen Archipels* (1880), and wrote *Die Stämme des Tierreichs: Wirbellose Tiere* (1890) and a general work on geology entitled *Erdgeschichte* (1885–87; 2d ed., 1895). The last-named work, while written in a popular style, may be commended for its comprehensiveness and scientific accuracy.

NEUMEISTER, noi'mīs-tẽr, ERDMANN (1671–1756). A German clergyman and hymn writer, born at Uechteritz, near Weissenfels, and educated at the University of Leipzig, where he was later professor of poetry. He is chiefly remembered for his hymns, some of which are of great merit and are still in use, such as "Jesus nimmt die Sünder an," "Will ich sagen," and "Lass irdische Geschäfte stehn," which have been translated into English. He wrote the text to Bach's cantatas. He also published a *Specimen Dissertationis Historico-Criticæ de Poetis Germanicis* (1695). His poetical works include *Fortgesetzte Fünffache Kirchenandachten* (1716–17) and *Zugang zum Gnadenstuhle* (1705). Consult the *Allgemeine deutsche Biographie*, vol. xxiii, p. 543; vol. xxviii, p. 808 (Leipzig, 1886, 1889).

NEUMES, nūmz (OF. *neume*, from ML. *neuma, pneuma*, song, musical sign, from Gk. *πνεῦμα*, pneuma, breath, from *πνεῖν, pnein*, to breathe). In Gregorian music, melodic ornaments, especially series of notes sung to one syllable. Also characters in a peculiar system of musical notation which was in use from the eighth or ninth to the eleventh century. The oldest preserved manuscript written in this notation is the Antiphonary of St. Gall (ninth century). No staff was used. The notes were represented by a system of dots and hooks and their respective pitch by the height at which they were placed above the syllables of the text. A single long note was indicated by the *virga* ( )), two notes on one syllable by the *bivirga* ( ))), three by the *trivirga* ( )))), etc. A shorter note was indicated by the *punctus* (•), two by the *bipunctus* (••), etc. The rising and falling of the voice was marked by a corresponding higher or lower position of the signs. In order to obviate the difficulty of determining the exact pitch of the various tones, a red line was drawn horizontally across the parchment (tenth century), and the signs were written above and below this line. Any sign upon the line denoted F. Before another century a second line was drawn above the red one. This was yellow and the note upon it was C. But in the plainer manuscripts the distinction of color was soon abandoned, and two black lines were drawn with the letters F and C placed at the beginning. In the course of time these letters underwent a series of conventional modifications, until they finally assumed the shape in which they are used to-day as clef signatures ( ). The G clef, which was added later, underwent a similar change . See MENSURABLE MUSIC; MUSICAL NOTATION; PLAIN CHANT. Consult: M. G. Houdard, *Le rythme du chant dit Grégorien après la notation neumatique* (Paris, 1897); O. Fleischer, *Neumen-Studien* (3 vols., Berlin, 1904); P. Wagner, *Neumenkunde*, part ii of *Einführung in die gregorianischen Melodien* (Freiburg, 1905).

NEUMÜNSTER, noi'mun'stẽr. A manufacturing town in the Province of Schleswig-Holstein, Prussia, on the Schwale, 38 miles north of Hamburg (Map: Prussia, C 1). The principal products are leather, paper, cartons, cloth, enamel ware, machinery, and ironwork. It has railway shops. Pop., 1900, 27,335; 1910, 34,555.

NEUNKIRCHEN, noin'kêrK-en, or **NEUENKIRCHEN.** A market town in the Austrian Crownland of Lower Austria, on the Schwarza, a branch of the Danube, 39 miles south-southwest of Vienna (Map: Austria-Hungary, E 3). It lies in an important coal-mining district, has a large iron foundry, and manufactures textiles, metal work, screws, paper, ultramarine, and boilers. Pop. (district), 1910, 70,543.

NEUQUÉN, nā'ōō-kān'. A territory of Argentina, situated on the west frontier of the Republic, and bounded by Chile on the west, the Province of Mendoza on the north, and the Territory of Río Negro on the east and south (Map: Argentina, F 5). Its area is about 42,345 square miles. The western part of the territory is covered by ramifications of the Andes, with intervening fertile valleys. The eastern portion is an elevated plain, lacking in rainfall and with meagre vegetation. A large part of the territory is watered by the headwaters of the Río Negro. There are numerous lakes, the principal one being Lake Nahuel-Haupi (q.v.) on the south boundary. The climate is dry, cool, and healthful. Agriculture and stock raising are the chief industries. Gold, silver, copper, coal, and petroleum are found, but mining is undeveloped. The territory is connected with Bahía Blanca and Buenos Aires by the Great Southern Railway. Pop., 1895, 14,517; 1912 (official estimate), 29,746, mostly Indians, though many Chileans have settled in the territory since the Indians were subjugated in 1884. The capital is Neuquén (pop., 1500).

NEURAL'GIA (Neo-Lat., from Gk. *νεῦρον, neuron*, nerve + *ἄλγος, algos*, pain). A sensory neurosis classed as functional and characterized by pain in the course of a nerve or nerves. The causes for neuralgia are legion, and more than one factor may be operative in a given case. It is not a disease of late life, but arteriosclerosis, a phenomenon of old age, is not an infrequent cause. Children rarely suffer from it. Neuralgias are divided into classes named from their underlying causes, as gouty, traumatic, hysterical, etc., as well as from their anatomical location, as trigeminal, lumbar, crural, sciatic, gastric, renal, visceral, cervico-occipital, brachial, and intercostal. The trigeminal, or facial, neuralgia is the most frequent, and the sciatic ranks next in frequency.

The most prominent symptom is pain, which is of a sharp, lancinating character or of a dull aching variety. Generally it appears in twinges of short duration, though of great intensity. Though principally following the course of the nerves, neuralgic pain pervades adjacent structures. Heat as well as cold generally increases it, as well as a light touch. Firm pressure sometimes relieves. In many cases painful points, generally corresponding to the places of exit of nerves from a bony structure, are found by testing with pressure. Numbness may accompany the pain, as well as muscular spasm in rare cases. The pain of neuralgia is usually increased

at night. It may return at regular intervals during the day, especially if dependent upon neuritis.

The treatment of neuralgia includes the use of rest, catharsis, the analgesics, hypodermic exhibition of morphine, as well as the local use of menthol, camphor, mustard, chloride of ethyl, chloroform, etc. Stretching of the nerve trunk as in sciatica (see NERVE STRETCHING; SCIATICA), excision of a part of the affected nerve, or removal of a ganglion of the sympathetic, may effect a cure. Permanent cure or temporary relief may be had from injection into or about the affected nerve or its ganglion of alcohol, normal saline solution, or cocaine. In all cases hygiene, diet, regimen, and tissue building are necessary, as well as the discovery and removal of any peripheral irritant, thereby stopping all nerve leaks. Refractive errors, decayed or impacted teeth, intranasal pressure, and accessory nasal sinus disease must always be sought for. See NEURITIS.

NEURALGIA, FACIAL. See FACIAL NEURALGIA.

NEU'RASTHE'NIA (Neo-Lat., from Gk. *νεῦρον, neuron*, nerve + *ἀσθένεια, astheneia*, weakness), nerve weakness. Perhaps the most frequent of the acquired neuroses. The symptom group making up this clinical entity was first familiarized by Beard of New York in 1869, and it is sometimes called the American disease, though now recognized as a world-wide malady. As a rule all forms of nervous energy are reduced and fatigue quickly appears upon the exercise of any motor, mental, or organic activity. It is essentially a disorder of the productive period of life, but does occur in neurotic children and in nervous adults of advanced years. The sexes are about equally affected. Hebrews, Scandinavians, and Slavs show a special susceptibility, and those of neuropathic heredity and the offspring of the physically defective are prone to be attacked by it.

Great altitudes, extremes of climatic conditions, wasting diseases, vicious habits, physical illness, injury, shock, and fright, or protracted anxiety, grief, worry, and excitement are competent causes. Excesses of all varieties and, finally and most important of all, overwork must be added to the list. The only essential element in the causation of neurasthenia is overstrain, and this is a quantity relative to the inherent capacities of the individual and often correlated with hereditary tendencies or defects.

The major symptoms of the disorder are headache, backache, gastrointestinal disturbances, neuromuscular weakness, mental depression, irritability, and insomnia. To these in varying number and of inconstant appearance are added tremor, twitchings, startings, sensations of general fatigue, pressure headaches, drawing feelings in the back of the neck and spine, tenderness at various points along the spine, particularly at its two extremities and at the waist, neuralgic pains, and various paræsthesiæ described as prickling, tightness, burning, numbness, stiffness, heat, cold, heaviness, soreness, and vague discomforts referred to the body viscera. Use of the eyes commonly intensifies the headache and causes prompt fatigue with increase in all the subjective complaints. Sometimes patients shun the light continuously. Nervous indigestion, gaseous fermentation, alternating diarrhœa and constipation, cardiac palpitation, feebleness of the circulation, and vascular storms are commonly presented. The activity of the functions of the genitourinary tract is reduced. On the mental side there is loss of concentration and consequently memory is enfeebled. Continuous application is impossible. Courage fails, introspection becomes habitual, and many apprehensions and distinct phobias of a hypochondriacal cast add to the patient's misery. The natural affections are diminished and depressed emotions are continuous. The sleep, disturbed by troubled dreams, is broken and unrefreshing. The early morning hours are particularly gloomy. The patient's general bodily condition is unsatisfactory. Anæmia and loss of flesh are commonly encountered, though exceptionally the general nutrition is excellent. The great majority of these symptoms it will be noticed are subjective, not demonstrable physically and capable of misrepresentation. For this reason such patients are misunderstood by their friends, who either foster the condition by misguided solicitude or give it scant sympathy. A careful examination proves that the nerve force is actually diminished and strength exhausted with undue ease. This is demonstrated by the contraction of the visual fields under appropriate tests, the initial exaggeration and progressive reduction of the tendon reflexes, the inability to maintain dynamographic records, the tendency to rapid heart, the digestive inadequacy, etc. Any one or even very many of the enumerated symptoms may be found in other ailments, but it is their systematic grouping and the exclusion of other definite morbid states that enables a diagnosis of neurasthenia to be made.

When the brain functions are principally disordered, the term "cerebral neurasthenia" is sometimes employed. In the same way spinal and sexual neurasthenia are mentioned, but in neurasthenia no function escapes, though there may be a varying preponderance of certain classes of symptoms. All functions are marked by an irritable weakness. Often this nervous disorder is associated with hysteria, particularly in the traumatic cases. Not seldom it is secondary to an initial bodily disease, which may or may not be present at the same time.

Neurasthenia is essentially chronic. Its causation is commonly of long standing, its onset insidious, its course protracted, its recession halting and marked by relapses, its tendency to recurrence pronounced. It is often associated with organic and inorganic diseases, and is encountered as an initial stage in the development of hypochondriasis, melancholia, mania, and general paresis. When uncomplicated by organic diseases, its prognosis is usually fairly good, provided the causal conditions can be removed and sufficient adequate rest and upbuilding secured. As it often arises out of the necessities of human existence and social conditions, its proper treatment is frequently impossible. The keynote is rest, and in proportion as this can be made complete both mentally and physically success results. The full rest-cure plan of Mitchell, especially with women, often secures brilliant results. In a modified form in mild cases it is also efficient. It implies the expenditure of much time and money. When this is not possible, change of scene, of occupation, of preëxisting influences, must otherwise be obtained. The burden of work, the fretting, and carking cares must be minimized, and the physical health and stamina raised to the highest possible level. If such patients can be fattened, success is almost

assured. Drugs play an entirely secondary part in the treatment of neurasthenia, merely meeting incidental physical requirements. Any underlying physical disease of which neurasthenia may be the superficial manifestation must of course receive major care. To the mental perturbation, however, constant attention must be directed. The patient's fears must be allayed, his hopefulness encouraged, his introspection diverted, and refreshing sleep secured. In proportion as the physician grasps the mental side of the disease, secures the patient's confidence, and meets the requirements of his biased views, is he successful and helpful in managing the neurosis.

A number of more or less speculative theories regarding the essence of neurasthenia are current, but nothing definite is known. Consult Church and Peterson, *Nervous and Mental Diseases* (8th ed., Philadelphia, 1914). See CLIMATE AND DISEASE.

NEUREUTHER, noi'roi-tẽr, EUGEN NAPOLEON (1806–82). A German painter, etcher, and illustrator, born in Munich, son and pupil of the painter Ludwig Neureuther (1775–1830). He also studied at the Munich Academy under Wilhelm von Kobell. His talent developed, however, chiefly under the influence of Cornelius, who employed him on the frescoes in the Glyptothek and in the Königsbau. His illustrations for Goethe's romances and ballads with marginal drawings, published in 1829–39, made his reputation. In 1830 Neureuther visited Paris, where his illustrations of the scenes of the July revolution appeared under the title "Souvenir du 27, 28, 29 juillet" (1831). After his return he published "Marginal Drawings to Bavarian Poets" (1832–35), and in 1838 completed his illustrations to Herder's *Cid*. His best etching, in which line he produced his most pleasing and valuable compositions, is perhaps the large plate of "Dornröschen" (1839). As a painter, he may be judged by "The Pastor's Daughter of Taubenhain," in the Pinakothek, Munich, and six canvases in the Schack Gallery at Munich. All his work is distinguished by great decorative charm and by purity and nobility of line.

NEURI'TIS (Neo-Lat., from Gk. *νεῦρον, neuron,* nerve). A disease of a nerve or nerves, accompanied by inflammation. Neuritis may be single or multiple, interstitial or diffuse, toxic or infective. It is caused by injury to the nerve involved by infection such as from typhoid fever, tuberculosis, or leprosy, or by the toxic action of alcohol, arsenic, lead, etc.

The symptoms of localized neuritis are severe pain, somewhat relieved when the part is at rest and kept warm, some numbness, reduction of the sense of touch, loss of power in the muscles, and eventual atrophy. There may be contraction of the muscles, with rosy color of the skin and a peculiar glossiness.

Multiple neuritis is very frequent. It is caused by the toxins of several infectious diseases, as diphtheria, typhoid fever, smallpox, and scarlet fever, as well as by mercury and lead, gout, diabetes, cancer, and tuberculosis, but most often by alcohol. In this form of neuritis the invasion is usually acute, with pain in head, back, and legs, loss of power in arms and legs so that the patient can scarcely climb the stairs, drop wrist and drop foot, muscular wasting, tenderness in the muscles, tremor, and sensory disturbances. Fever is rare, and the invasion of the disease is slow. When alcohol is the cause, delirium and convulsions may occur, with hallucinations, somewhat resembling delirium tremens. Multiple neuritis is frequent in various countries, under various names. It is called kakké in Japan, and beriberi in China, New Zealand, India, Brazil, and the West Indies, in which countries it is endemic. Its course is similar to that of alcoholic multiple neuritis. Its mortality varies from 3 to 50 per cent. The mortality of alcoholic neuritis is not much smaller. Of those who continue the use of alcohol, 50 per cent die of alcoholism, pneumonia, or tuberculosis. Treatment is symptomatic, with removal of the cause. See BERIBERI.

NEUROG'LIA. See NERVOUS SYSTEM AND BRAIN.

NEUROL'OGY (from Gk. *νεῦρον, neuron,* nerve + *-λογία, -logia,* account, from *λέγειν, legein,* to say). The branch of science concerned with the anatomy, physiology, disorders, and diseases of the nervous system. Brain functions associated with mentality are somewhat arbitrarily placed in the field of psychology, and their disorders furnish the topics grouped under the head of psychiatry. Neurological conditions are also studied in the lower animals, giving a subdivision of the subject, comparative neurology, which with embryology furnishes important facts which aid in understanding the human nervous apparatus. In the more limited medical sense, neurology embraces a study of the human nervous system, its diseases (except insanities) and their treatment. See NERVOUS DISEASE.

NEUROMA, nû-rō'mȧ (from Gk. *νεῦρον, neuron,* nerve + *ωμα*). A tumor, composed chiefly of sympathetic ganglion cells (true neuroma) or of fibrous tissue (false neuroma). See TUMOR.

NEURON, nū'rŏn (Gk. *νεῦρον, neuron,* nerve). See NERVOUS SYSTEM AND BRAIN.

NEUROP'TERA (Neo-Lat. nom. pl., from Gk. *νεῦρον,* neuron, nerve + *πτερόν, pteron,* wing). A Linnæan order of insects which has recently been restricted by separating out the orders Mecoptera, Corrodentia, Isoptera, Odonata, Ephemerida, Plecoptera, and Trichoptera, which together for a time were known as the Pseudoneuroptera. At present the Neuroptera include those forms belonging to the old group of net-winged insects which possess a complete metamorphosis. The mouth parts are formed for biting. The wings are four in number, membranous, and furnished with numerous veins, usually with many cross veins. Practically all forms are carnivorous and feed upon other insects. Some of them are aquatic, but the majority live on land and wherever their prey abounds. The order is divided into seven large families:

1. The Sialidæ, including the dobson or hellgramite fly (see CORYDALIS), the alder flies (*Sialis*), and the fish flies (*Chauliodes*).

2. The Raphidiidæ, or snake flies (q.v.).

3. The Mantispidæ, including the false rear-horses, or mantis-like Neuroptera. These insects, rare in the United States, have a long neck and grasping front legs, and are predatory in habits. Their transformations are especially interesting.

4. The Conopterygidæ, including the dusty-wings, which are the smallest of the Neuroptera and have wings covered with whitish powder. They are very few in number, and prey, in the larval stage, upon scale insects, plant lice, and red spiders.

5. The Myrmeleonidæ, or ant lions (see ANT LION).

6. The Hemerobiidæ, or aphis lions (see APHIS LION).

7. The Chrysopidæ, or golden-eyed lace-winged flies. See LACEWING.

Nearly all the families of Neuropteran insects are represented by fossil remains in the Tertiary rocks; and some, such as the dragon flies, caddis flies, May flies, and white ants, appear in the still earlier Mesozoic formations.

Consult: David Sharp, *Cambridge Natural History*, vol. v (London, 1895); V. L. Kellogg, *The Insect Book* (New York, 1908); J. H. Comstock, *Manual for the Study of Insects* (8th ed., Ithaca, 1909); L. O. Howard, *The Insect Book* (New York, 1914).

NEUROP'TERIS (Neo-Lat., from Gk. *νεῦρον, neuron*, nerve + *πτερίς, pteris*, fern). An important genus of fossil ferns common in the coal-measure shales and sandstones of Carboniferous age in North America and Europe. See CARBONIFEROUS SYSTEM; FERN.

NEURO'SIS (Neo-Lat., from Gk. *νεῦρον, neuron*, nerve). A morbid nervous state, either functional (due to reflex disturbance from a lesion or a condition in another part of the body) or organic (due to local conditions). Neuroses are classed as *kinesioneuroses*, or disorders of motion; *æsthesioneuroses*, or sensory disorders; *trophoneuroses*, or disorders of nutrition; *thermoneuroses*, or disorders of heat perception; *vasomotor neuroses* or *angioneuroses*, or disorders of circulation; *secretory neuroses;* and *mixed neuroses*. Among the latter are the *acroneuroses*, certain disorders affecting the extremities, such as acroparæsthesia and erythromelalgia; *sexual neuroses*, affecting the functions of the sexual organs; and *psychoneuroses*, in which there is a combination of mental and physical symptoms due to a complex condition. Many of these functional neuroses are considered under their proper titles.

The occupation neuroses are functional disorders consisting of numbness, tingling, partial loss of muscular power, involuntary contractions or spasms, tremor and disability, which combine to prevent the use of certain groups of muscles which have been used habitually by the patient in his occupation or professional labors. An occupation neurosis and atrophy is really a condition of muscle fatigue occurring in a neurasthenic, with subsequent neuritis in a few cases. The most common neurosis of this class is *writers' cramp*, or *scriveners' palsy*. This disease has been known since about 1820, when the steel pen superseded the quill. Worry, intemperance, and other undermining influences are predisposing causes, as well as preëxisting neurasthenia, as already noted. Excessive writing, under mental pressure, is the exciting cause, especially if the writing is done with the hand in a cramped position. It is a chronic disease. Many sufferers learn to write with the left hand, but this also may become affected. The use of gold pens has brought some relief and has controlled the increase of the affection among writers. But the great refuge and preventive is the typewriter, although this instrument itself may engender a neurosis. Those who write much should use large cork penholders and gold pens. Writing under cerebral strain should be avoided.

Telegraphers' cramp is common among the manipulators of the Morse instrument. About one in 200 operators suffer from "loss of the grip." The symptoms are much the same as in writers' cramp. Among the other occupation neuroses are *musicians' cramp*, seen in pianists, violinists, flutists, and others; *sewing spasm*, among tailors, seamstresses, and shoemakers; *milkers' spasm*, which is very rare; *ballet-dancers' cramp*, and many others. The *glass arm* of the ball player and the *tennis elbow* are really forms of occupation neurosis.

In the treatment of occupation neuroses, rest or change of occupation, massage of nerve and muscle, electricity, douches, and the cautery have proved useful. Drugs are generally useless, except such as relieve the neurasthenia of the patient. Consult Church and Peterson, *Nervous and Mental Diseases* (8th ed., Philadelphia, 1914). See OCCUPATIONAL DISEASES.

NEUROT'IC (Neo-Lat. *neuroticum*, from *neurosis*). A word partly synonymous with nervous, now commonly used to describe an individual who suffers from nervous disease, such as neurasthenia or hysteria, or who is of pronounced nervous temperament. The term "neurotic" was formerly used in medicine to specify such a drug as tends to affect principally and specifically the brain centres that govern intellect, sensibility, and motor activity. Alcohol, ether, chloral, opium, potassium bromide, amyl nitrite, and strychnine are examples of drugs to which this name may be applied.

NEURUPPIN, noi'rŭp-pēn'. A town of the Province of Brandenburg, Prussia, on the small lake of Ruppin, connected with the Elbe, 36 miles northwest of Berlin (Map: Prussia, E 2). It has a thirteenth-century church, a Gymnasium, and a seminary for teachers. Its industries are brewing, spinning, and the manufacture of linen and woolen cloths, starch, brushes, fire extinguishers, lithographed work, machinery, and lumber. There is also considerable trade in cattle and cereals. Neuruppin became a town in 1256. Pop., 1900, 17,100; 1910, 18,720.

NEUSALZ, noi-zälts'. A town in the Province of Silesia, Prussia, on the Oder, 75 miles northwest of Breslau (Map: Prussia, F 3). The principal manufactures are linen thread (employing 2200 hands), cartons, machinery, lumber, cartridges, and enamel. It has iron mines and a shipbuilding trade. Pop., 1900, 12,586; 1910, 13,474.

NEU-SANDEC, noi-zän'dĕts. A town of the Crownland of Galicia, Austria, on the Dunajec, about 45 miles southeast of Cracow (Map: Austria, G 2). It has a Roman Catholic church of the fifteenth century, an Evangelical church of the seventeenth century, an old castle, a new town hall, a Gymnasium, a girls' convent school, a Jesuit college, and a hospital. The chief industrial establishments are the extensive railway shops. Machinery and flour are produced, there are fisheries, and in the vicinity of the town petroleum wells. Pop., 1910, 25,404; (district) 136,366, mostly Poles and Jews.

NEUSATZ, noi'zäts (Hung. *Ujvidék*). A royal free town in the County of Bács-Bodrog, Hungary, situated on the left bank of the Danube, opposite the town of Peterwardein and at the mouth of the Franz-Josefs Canal, 163 miles south-southeast of Budapest (Map: Hungary, F 4). It is a town of recent origin, having been practically rebuilt since its destruction in 1849. It is the seat of the Greek Oriental Bishop of Bács and has a new cathedral, a higher Gymnasium, an industrial and a commercial school. Its products include millstones, silk, conserves, and spirits, with good fruit, vegetables, and wines. The river trade is large. Neusatz is the

seat of the Matica Srpska, the chief literary and scientific organization of the Serbs in south Hungary. Pop., 1900, 29,296; 1910, 33,089, mostly Serbs and Magyars.

NEUSE, nūs. A river of North Carolina, rising in Person County in the northern part of the State and flowing southeast into the west end of Pamlico Sound (Map: North Carolina, F 3). It is about 300 miles long and navigable for light-draft steamers for about 70 miles from its mouth. At Newbern, 34 miles from its mouth, it widens into a broad estuary. The stream is from 1¾ to 5 miles wide and has a channel depth of more than 13 feet for 25 miles above its mouth; for the next 9 miles (to Newbern) the channel depth is 11 feet.

NEUSIEDLER SEE, noi'zĕd-lēr zā (Hung. *Fertö-Tava*). A lake in northwest Hungary, 30 miles southeast of Vienna (Map: Hungary, E 3). It is about 23 miles long, from 4 to 9 miles wide, and covers an area of 126 square miles, but its surface is not permanent. On the east shore is the large swamp of Hanság, but the land on the west shore consists of vine-clad hills, with several thriving towns. The water is salty and unfit to drink. The lake has dried up on several occasions, notably in 1865, when farms were laid out in its bed; but in 1870 it filled up again, destroying all improvements. It is now connected with the Rabnitz River by a canal which, in case of a flood, drains off the surplus water.

NEUSOHL, noi'zōl (Hung. *Beszterczebanya*). The capital of the Province of Sohl, Hungary, at the confluence of the Gran and Bistritz, 75 miles north of Budapest (Map: Austria-Hungary, F 2). It has a cathedral noted for its fine fourteenth-century altar, other ecclesiastical structures, and an old castle, now used as barracks. There are manufactures of hardware, firearms, paper, cloth, matches, and spirits, and a silver foundry. Four and a half miles to the north are the Herrengrund silver, iron, and copper mines. Pop., 1910, about 12,000; (district) 33,268.

NEUSS, nois. A town in the Rhine Province, Prussia, near the Rhine, with which it is connected by a canal, 4 miles west of Düsseldorf (Map: Prussia, B 3). The Roman Catholic church of St. Quirinus, a beautiful edifice of the transition from the round to the pointed style, was begun in 1209. The late Gothic Rathaus is interesting for its collection of paintings by Janssen. Neuss produces a large amount of rape oil. There are manufactures of paper, machinery, ironware, screws, hats, soap, starch, oleomargarine, chicory, chemicals, bricks, lumber, meal, cravats, leather, and woolens; there is a trade in grain, cattle, and coal. Pop., 1900, 28,484; 1910, 37,224. The town is supposed to be the Novesium of the Romans. It came under the Archbishop of Cologne in 1074. In 1474 it suffered a long siege by Charles the Bold, and a century later was almost totally destroyed by Alexander of Parma.

NEUSSER, noi'sēr, Edmund von (1852–1912). An Austrian physician. He was born in Swozowice, Galicia, studied medicine in Vienna (M.D., 1877), was admitted as lecturer to the medical faculty of the University at Vienna in 1888, and was appointed professor of medicine and director of the second medical clinic in 1903; from this position he resigned in 1912. He made reports to the Austrian government on pellagra as observed in Friaul and Rumania and described in *Die Pellagra in Oesterreich und Rumänien* (1887), and is the author, among other writings, of *Ausgewählte Kapitel der klinischen Symptomatologie* (1904) and *Clinical Treatises on the Symptomatology and Diagnosis of Disorders of Respiration and Circulation*, English translation by Andrew MacFarlane (New York, 1901–09). He wrote for Nothnagel's *Specielle Pathologie und Therapy*, "Die Erkrankungen der Nebennieren" (1897; English translation, "Diseases of the Suprarenal Capsules," in *Nothnagel's Practical Diseases of the Liver, etc.*, 1903).

NEUSTADT, noi'stät. A city in Upper Silesia, Prussia, on the river Prudnik, 29 miles southwest of Oppeln (Map: Prussia, G 3). It has two monasteries, a Gymnasium, and a school to teach the weaving of Persian rugs. There are manufactures of woolen and linen fabrics, damask, carpets, shoes, dyes, and yeast. Pop., 1900, 20,139; 1910, 18,856.

NEUSTADT, Heinrich von. See Heinrich von Neustadt.

NEUSTADT, Wiener. A town of Austria. See Wiener-Neustadt.

NEUSTADT-ON-THE-HARDT, härt. A town in the Rhine-Palatinate, Bavaria, situated in the Hardt Mountains, 14 miles west-northwest of Speyer (Map: Bavaria, D 4). The abbey church (1356) contains many tombs of the Counts Palatine. The educational institutions include a Gymnasium, a Realschule, a Latin school founded in 1579, and a vintner's school. Neustadt manufactures cloth, paper, tobacco, machinery, boilers, cement, starch, wire cloth, and furniture. In the vicinity are extensive vineyards, from which a good grade of sparkling wine is produced. Pop., 1900, 17,800; 1910, 19,288, chiefly Protestants.

NEUSTETTIN, noi'stĕt-tēn'. A town in the Province of Pomerania, Prussia, 80 miles southwest of Danzig (Map: Prussia, G 2). There are manufactures of machinery, ironware, dyes, soap, and matches, and trade in grain and cattle. Pop., 1905, 10,785; 1910, 11,833.

NEUSTRELITZ, noi-strā'lĭts. The capital of the Grand Duchy of Mecklenburg-Strelitz, Germany, 60 miles north by west of Berlin (Map: Germany, E 2). It is laid out with remarkable regularity, its wide, straight streets radiating in eight directions from the market place, which is adorned with a statue of the Grand Duke George. The principal buildings are the grand ducal palace, situated in a beautiful park and containing a fine library of 130,000 volumes and collections of coins and antiquities, the theatre, the royal stables built in Byzantine style, and the Rathaus. There are also a Gymnasium, a Realschule, and a fine hospital. The principal manufactures are machinery, stoves, woolens, lumber, cloth, vinegar, flour, conserves, and dairy products. Neustrelitz was built in 1726 on the site of the old fortress of Lunkin. Pop., 1900, 11,344; 1910, 11,993.

NEUSTRIA, nūs'trĭ-ȧ (Lat. *Francia occidentalis*, west France). The name given in the times of the Merovingians to the western portion of the Frankish Empire, in contrast to Austrasia (q.v.). Later it was used for various territorial divisions; in the eleventh century and later it was often used as synonymous with Normandy. Consult Longnon, *Atlas historique de la France* (Paris, 1889). See Franks.

NEUTITSCHEIN, noi'tĭt-shīn. A town in the Crownland of Moravia, Austria, on the

Titsch, 70 miles northeast of Brünn (Map: Austria, F 2). It has a Byzantine church and an old castle, a higher Realschule, and schools of agriculture, forestry, and textiles. There are manufactures of tobacco, vehicles, organs, spirits, hats, and cloth. Pop., 1910, about 15,000; (district) 85,245, chiefly of German descent. Near by is the sulphur bath of Sommerau.

NEUTRAL AXIS (Lat. *neutralis*, from *neuter*, neuter, from *ne-*, not + *uter*, either). An imaginary line of a body which is subjected to a transverse strain and is so situated as to separate the forces of extension from those of compression. If the ratio of the resistance to extension and compression were the same for all substances and depended merely upon the form of the body, then in all bodies of the same shape the neutral axis would have a definite geometric position. But this ratio has a separate value for every substance. In a rectangular wooden beam supported at both ends, the neutral axis passes longitudinally through the centre of the beam, while in cast iron, in which the resistance to compression is greater than that to extension, it is a little above the centre, and in wrought iron, in which the contrary is the case, it is a little below the centre.

NEUTRAL IDIOM. See UNIVERSAL LANGUAGE.

NEUTRALITY. Neutrality is the situation of states which do not enter a war. It is *temporary* when assumed with respect to a specific war, by virtue of a voluntary act; *perpetual* when it is assumed in advance for all wars to come, by virtue of a formal obligation. The conception of neutrality is of relatively recent origin and as yet is only imperfectly developed.

Temporary Neutrality. Temporary or optional neutrality is as old as war itself, but the recognition of a right of neutrality and the determination of the rights and duties of neutrals are recent. A law of neutrality, amounting as it does to a limitation of belligerency, is only possible at a time in history when neutral nations become strong and numerous. It was not till the eighteenth century (Vattel, 1758) that an attempt was made to present a complete theory of neutrality under that name. Grotius in the seventeenth century suggested that neutrals should form an opinion upon the justice or injustice of the hostilities, and then he bade them "do nothing which would further the cause of the one in the wrong, or hamper the movements of the one in the right." However, in doubtful cases he demanded that neutrals should treat both parties equally. (*De Jure Belli ac Pacis*, book iii, chap. xvii, 3, 7.) According to Vattel, on the other hand, the neutral is not, on principle, to constitute himself a judge of the justice or injustice of the cause of the war. For the principle of unequal treatment of belligerents in accordance with the justice or injustice of the war is substituted the principle of impartiality, i.e., of equal treatment for both belligerent parties. But there was an exception to that equality of treatment in cases where, by a treaty concluded before the war, the neutral had engaged to furnish assistance, either in subsidies or troops. Regard for treaties thus limited the law of neutrality, which was the more imperfect in that it was not until somewhat later that it found its basic principle. This basic principle is respect for neutral sovereignty. To make war is an act of sovereignty, but the sovereignty of a state does not extend beyond the limits of its jurisdiction. The neutral, therefore, cannot be obliged to allow the belligerent to commit an act of war within its territory. Not only should a belligerent never enter neutral territory, despite the numerous territorial violations of the seventeenth and eighteenth centuries, nor even follow an enemy ship into neutral waters, despite the contrary opinion of Bynkershoek (*Quæstiones Juris Publici*, book i, chap. viii, 1737), but by the end of the eighteenth century it had been settled that the fitting out of privateers and the adjudication of prizes, acts of belligerent sovereignty, could not be effected within the jurisdiction of a neutral without violating its sovereignty. The American Secretary of State, Jefferson, wrote to citizen Genet, Minister from France, that it is "the right of every nation to prohibit acts of sovereignty from being exercised by any other within its limits." Furthermore, the raising of troops and the granting of military commissions were sovereign rights which, as they pertained exclusively to the nation itself, could not be exercised within its territory by a foreign power without its consent. In June, 1794, the first Neutrality Act was passed, forbidding within the United States the acceptance and exercise of commissions, the enlistment of men, the fitting out and arming of vessels, and the setting on foot of military expeditions, in the service of any prince or state with which the government was at peace. (John Bassett Moore, *American Diplomacy*, 1905, pp. 43–46.) In 1818 was passed the Foreign Enlistment Act, which, subsequently amended and developed, is still in force. It prohibits all citizens of the United States from serving in a war against a state with which the United States is at peace and forbids the equipping and arming, within the limits of American jurisdiction, of a vessel destined to be used as a cruiser in a war during which the United States remains neutral, or the increase or the armament of such a vessel in a port of the United States, or the organizing within the territory of the Republic or its waters of an expeditionary force directed against a country with which the United States is at peace. It is out of respect for its own sovereignty that a neutral state places limitations on the activity of belligerents and thus makes war recede before neutrality.

The moment that a neutral is conscious of its right to prevent a belligerent from using its territory for battle, for the passage of troops that would surely lead to battle, for the arming of vessels and the adjudication of maritime prizes, it is equally conscious that it ought to abstain from all acts which, in favoring one of the belligerents, would give the other a motive to enter its territory in order to put a stop to such acts. Reason requires that a neutral, in order to keep its sovereignty intact during the course of a war, shall refrain from taking part in the operations of that war. Accordingly a neutral is not permitted to give or sell arms or munitions drawn from the arsenals of the state or government manufactures, or condemned ships of the fleet, still less subsidies from the public funds; but it is not contrary to the obligations of neutrality for a state to permit its citizens, in the free exercise of industry and commerce, to manufacture for and sell to belligerents arms, munitions, and detached parts of vessels. Neutrality is the duty of the state;

it is not the duty of the individual citizen. This distinction is clearly laid down in Conventions V and XIII of The Hague Conference of 1907: A neutral Power must not allow belligerents "to move troops or convoys of either munitions of war or supplies across" its "territory." Likewise a neutral Power must not allow belligerents to form corps of combatants, or recruiting agencies to be opened to assist the belligerents (Convention V, Arts. II, IV, V), or to establish a prize court on its territory or on a vessel in its waters, or to use its ports and waters as a base of naval operations against its adversaries, or to erect wireless telegraph stations or any apparatus for the purpose of communicating with the belligerent forces on land or sea, or to supply, in any manner, directly or indirectly, warships, ammunition, or war material. (Convention XIII, Arts. IV, V, VI.) But, according to Article VII of Conventions V and XIII (same text for both Conventions), "A neutral Power is not bound to prevent the export or transit, for the use of either belligerent, of arms, munitions of war, or, in general, of anything which could be of use to an army or fleet." The principle, thus established, of the freedom of neutral commerce in military supplies in time of war, is, however, subject to one exception, viz., warships, the equipping, arming, and departure of which for the immediate purpose of cruising on the high seas for war or capture, must be prevented by neutral Powers by every means at their disposal. Such a military unit organized on neutral territory would transform that territory into a base of military operations, in disregard of the principle of territorial inviolability of a neutral state above set forth. The rule governing cases of this kind arose out of the controversy with Great Britain over the cases of the *Alabama* and other Confederate cruisers equipped in England during the American Civil War, and was embodied in the Treaty of Washington of May 8, 1871, and reproduced in Article VIII, Convention XIII, of Oct. 18, 1907, at The Hague. It seems obvious that this rule, framed to cover the case of complete naval units, designed for cruising immediately after leaving neutral waters, could not have any application to detached parts of submarines or even, according to the decision of the American Department of State, March, 1915, to hydro-aëroplanes.

After being based for upwards of 100 years upon the respect for sovereign territory, the legal aspect of neutrality tends, since the close of the nineteenth century, to find its basis elsewhere. This new viewpoint is that, war being contrary to international order, to the common interests of the peoples, which are becoming more and more unified, and to the general good of humanity, which will not permit that anywhere on the globe men shall be insensible to the sufferings of others, it is the right and duty of states not involved in an international controversy to use their efforts to prevent the outbreak of war; then, if hostilities commence, to multiply their efforts to restrict the war zone as much as possible and to hasten the end of the struggle. By virtue of this new conception, embodied in The Hague Conventions of 1899 and 1907, For the Pacific Settlement of International Disputes, Article 3, "Powers, strangers to the dispute, have the right to offer good offices or mediation even during the course of hostilities." "The exercise of this right can never be regarded by either of the parties in dispute as an unfriendly act." But further, by virtue of the same idea it is not the duty of neutral states to circumscribe the area of war and lessen the force of hostilities by preventing their citizens from carrying on commerce in arms and munitions of war or from loaning money to belligerents, and by preventing the coaling and repairing of belligerent warships, even when closing, except on internment, the ports of neutrals to such vessels. The progress of the pacific idea gives more and more force to the principle that neutral states ought, not only by abstention but also by action, to deprive belligerents of any kind of assistance, direct or indirect, within the limits of their jurisdiction. In Conventions V and XIII of Oct. 18, 1907, at The Hague, the solution of these diverse questions has been left in a systematic manner to the discretion of the neutral state. To each individual state, out of the fullness of its sovereignty, it leaves the right to say whether it will prohibit the exportation or transportation to belligerents of arms and munitions of war; whether it will prohibit or restrain the use by belligerents of telegraph or telephone cables or wireless apparatus, whether belonging to companies or to individuals; whether a belligerent war vessel may stay in its ports more than 24 hours (Convention XIII of 1907, Art. XII), excepting in the case of a storm at sea; and each state may fix the maximum number of warships belonging to a belligerent which may be in one of the ports or roadsteads simultaneously. (Art. XV.) Finally, each state may allow warships to coal in its ports or waters, either directly or through dealers, in a quantity even more than sufficient to reach the nearest port in their own country. (Convention XIII of 1907, Art. XIX.) But if it does not prohibit the exportation of arms and munitions at the opening of hostilities, the neutral state cannot change the rule in the course of the struggle, "except in a case where experience has shown the necessity for such change for the protection of the rights of that Power." Further, if at the beginning of hostilities, and subject to the preceding exception, the neutral state has not passed legislation upon the length of stay, the number and restocking of belligerent vessels in neutral waters, Convention XIII of 1907 has supplied a course to be followed. In the absence of special provision to the contrary in the legislation of a neutral Power, belligerent warships are not permitted to remain in the ports, roadsteads, or territorial waters of the said Power for more than 24 hours, except in the cases covered by the present conventions. (Art. XII.) In the absence of special provisions to the contrary in the legislation of a neutral Power, the maximum number of warships belonging to a belligerent which may be in one of the ports or roadsteads of that Power simultaneously shall be three. On principle, belligerent warships may ship only sufficient fuel to enable them to reach the nearest port in their own country, but they may fill up their bunkers built to carry fuel when in neutral countries which have adopted this method of determining the amount of fuel to be supplied.

In the determination of the rights and duties of neutrals it is impossible not to reckon with the difficulties for neutrals which arise from obligations too numerous and too strict. It would

be imprudent to lay down such rules as a neutral could not make a belligerent respect. Not only should the duty of a neutral be limited in principle to abstention from all direct aid, or the prohibition of every act which would transform its territory into a base of operations, but, apart from the matter of direct aid, a neutral state can only be expected to use "due diligence," in accordance with the terms of the Treaty of Washington of May 8, 1871, in the affair of the Alabama claims, or, in accordance with the interpretation by Articles XVIII and XXV of Convention XIII of The Hague of Oct. 18, 1907, to exercise such surveillance as the means at its disposal permit. After having used all its efforts, even to a display of force, to prevent the violation of its neutrality, the neutral should do all in its power, once this violation has been committed, to put an end to its effects. When a ship has been captured in the territorial waters of a neutral Power, this Power must employ, if the prize is still within its jurisdiction, the means at its disposal to release the prize with its officers and crew and to intern the prize crew.

If the prize is not within the jurisdiction of the neutral Power, the captor government, on the demand of that Power, must liberate the prize with its officers and crew. (Convention XIII of 1907, Art. III.) Finally, neutrals have the incontestable right to refuse the access of their ports and waters to warships which would violate their neutrality. (Convention XIII of 1907, Art. IX.) More than that, in the event of an embargo on arms or the refusal of hospitality to belligerent warships, the neutral state assumes an authority over the Powers at war, which permits it to demand of them respect for its commerce in the measure which the legitimate necessities of war permit.

The belligerent whose war halts or menaces commerce profits by its command of the sea in so far as it succeeds in paralyzing rival traffic. As much for defending its commerce against the rivalry of neutrals as for preventing the enemy from sustaining or developing its economic forces, the belligerent has but one aim—to prohibit a neutral from all commerce with its adversary. The neutral resists. The greater it grows the stronger becomes its resistance and the more its commercial liberty extends. After having in the fourteenth century prohibited all neutral commerce with the enemy, belligerents now limit themselves to prohibiting trade in certain articles to some point of the enemy's coast or, on the other hand, to limiting the trade in all articles to a destination at certain designated points of the hostile coast. In the first instance the prohibition of commerce results in the listing of certain articles, called contraband of war, as forbidden to commerce. In the second case the prohibition results in the employment of naval force to cut off all trade with certain enemy ports. A belligerent may arbitrarily increase the list of articles in the catalogue of contraband of war and may announce a blockade without assembling a naval force sufficient to make it effective. Such a multiplication of lists of contraband and such fictitious, or "paper," blockades quickly draw protests from neutrals. These latter strive for two reforms—the limitation of contraband to articles immediately in demand for hostile purposes and the limitation of blockades to such as actually bring to bear a force sufficient to assure respect for them. The rules governing blockades and contraband of war are the result of a compromise between the interest of the belligerent, which is to cut off neutral commerce, and the interest of the neutral, which is to continue it. To impose on neutrals the renunciation of all commerce with blockaded ports, the belligerent on his part must maintain a naval force sufficient to make it impossible for the neutral to engage in commerce with the blockaded ports without grave danger of capture; in other words, the blockade must be effective. To make neutrals renounce dealings with the whole hostile coast, the belligerent should give them the liberty of trading in certain articles designed for the noncombatant population, and even of certain other articles that could neither directly nor indirectly serve military purposes, and this without regard to their final destination. Briefly, then, the belligerent guarantees the prohibition of neutral commerce in absolute contraband (arms, munitions), as distinguished from relative or conditional contraband (foodstuffs, coal), the transport of which is prohibited only when destined for a military or naval base, for the contractor of an enemy state, or, more generally, for any branch of the administration of that state. The progress of the law of neutrality tends to limit the power of blockade by the substitution of real effectiveness for fictitious effectiveness, and to limit contraband by the curtailment of lists of conditional as well as of absolute contraband. At the same time, neutral commerce tends to remove neutral merchandise from the status of enemy private property under an enemy flag, by proclaiming neutral private property under an enemy flag to be exempt from seizure, and to favor neutral navigation by the adoption of the principle that the neutral flag covers enemy merchandise. Three great international acts mark in the commercial field the increasing recognition of neutral rights. By the Declaration of St. Petersburg, Feb. 26, 1780, inspired by the French Minister to Catharine of Russia, Vergennes, and directed by the northern courts against the maritime tyranny of Great Britain, contraband of war was reduced to arms and munitions; enemy private property was unseizable under a neutral flag, although neutral private property was seizable under an enemy flag; blockades were to be constituted by ships constantly on guard and reasonably close at hand. In virtue of the Declaration of Paris, April 16, 1856, the English rule that neutral private property is unseizable under a hostile flag is combined with the French rule that enemy private property is unseizable under a neutral flag; blockades had to be effective, i.e., of a kind that involved evident danger of entry and departure; but, unlike the provisions of the Declaration of 1780, which emanated from neutrals, those of 1856, which followed the Crimean War, emanated from belligerents. These latter reserved the right, in not defining contraband, of withdrawing the concession that had just been made to neutrals by Great Britain in ceasing to seize private enemy property under a neutral flag, France agreeing to refrain from seizing neutral private property under an enemy flag. The progress of the law of neutrality demanded imperiously the precise determination of what articles constituted contraband. In the light of the experience of the Russo-Japanese War, that necessity was, after a vain effort to

suppress contraband, satisfied under English initiative, by the Declaration of London, Feb. 28, 1909. By virtue of this declaration, signed by the Great Powers and by Spain and Holland, but not yet ratified and hence without force in the Great War which began in 1914, blockades had to be effective; absolute contraband of war became limited to arms, munitions, and objects of immediate use in war; objects which could serve peace as well as war (foodstuffs, combustibles, etc.), constitute together with absolute contraband a relative contraband whose transportation is not forbidden unless they are destined to combatants; finally, certain articles such as cotton are declared as never to figure on contraband lists, whether relative or absolute.

The doctrine of continuous voyage which permits delaying merchandise, when merchandise has a destination from an unprohibited port to an ulterior destination at a prohibited port (blockaded or neutral), is not to apply in future in the case of blockades, and, maintained in the case of absolute contraband, does not extend to relative contraband unless the neutral port affords access by sea to a state (e.g., Abyssinia or the Transvaal) devoid of seacoast.

The destruction of neutral prizes admitted by France but repudiated by England and the United States was accepted as permissible only in cases of proved necessity. The convoy of neutral merchant ships by warships of their own nationality protects them from the right of visit and search by enemy cruisers. Like the prior Declaration of Paris of 1856, the Declaration of London is indivisible, i.e., is not open to acceptance in one part and rejection in another. Not originally signed by Spain and Mexico, who were to repair that omission in 1907, the Declaration of Paris was never signed by the United States, which was unable to accept its essential principle, the abolition of privateering, unless enemy private property should be declared unseizable under an enemy flag. But the principles of this declaration have been constantly followed, in what concerns blockade and the unseizability of enemy private property under a neutral flag, by the United States, which sees in these rules customary principles of positive international law.

Perpetual Neutrality. A state perpetually neutral renounces the right of making war and, in consequence, the right of contracting alliances, even purely defensive, because these would lead to war through the duty of sustaining an ally, or, if the ally did not demand aid, would place such neutral state in a situation of political dependence which would put it in danger of annexation. While a state perpetually neutral loses with the right of offensive war the right of annexing territory by force, it acquires, as regards other states, the right of never having to submit to war or annexation. Meanwhile such a state has the right, and may be under an obligation, to defend its neutrality if attacked.

Perpetual neutrality made its first entry into history in 1815 by the neutralization of Switzerland; it developed in 1831 by the neutralization of Belgium; then, in 1867, of Luxemburg; and finally, in 1885, of the Congo Free State. While the neutrality of Switzerland was in accordance with the historic aspirations of the Swiss people, that of Belgium in 1831 was rather in the interest of Europe and its desire to oppose a barrier to the French longing for expansion and conquest, than in accordance with the will of Belgium; Belgium detached from the great Kingdom of the Netherlands seemed to Europe too frail a barrier; it was necessary to strengthen it. Against her inclination she submitted to an enforced and permanent neutrality as the price of her independence. By the Treaty of London, March 11, 1867, Luxemburg was in like manner neutralized. These three instances of permanent neutrality, differing in historical origin, could not have exactly the same juridical status. Belgium was prevented, in 1842, by the opposition of Great Britain from concluding a customs union with France, for a customs union, usually only a preliminary to a political union, seems incompatible with neutrality. On the other hand, in 1867, Luxemburg remained in the German customs union (the Zollverein). Belgium, like Switzerland, could have arms and fortresses; Luxemburg could have neither. Prussia, which kept a garrison there in the name of the North German Confederation, had to withdraw her soldiers, and the fortifications of the capital had, by virtue of the treaty, to be demolished.

These three neutralities, imposed in the interest of those neutralized, but still more in the interest of European peace and equilibrium, sprang from conventions to which they owe their strictly obligatory character. The neutralization of the Congo Free State was otherwise accomplished—under the authority given by the Act of Berlin of Feb. 26, 1885, to the Conventional Powers of the Congo Basin, which permitted the Congo Free State to place itself under a régime of neutrality. While the neutrality of Switzerland, of Belgium, and of Luxemburg is an obligatory neutrality, from which the neutralized state cannot free itself without the consent of the signatories of the neutrality treaty, the neutrality of the Congo is a facultative neutrality, springing from a unilateral declaration of its King, which could at the present hour be withdrawn, had not Belgium been substituted, in 1908, for Leopold II in the sovereignty of the Congo Free State; for Belgium as a perpetually neutral state could not retract the declaration of neutrality of a Belgium colony. The neutrality of the Congo, being thus, owing to its different origins, a facultative neutrality, is not, like that of the other states just mentioned, a guaranteed neutrality.

Convention V of The Hague Conference of 1907, in fixing the rights and duties of temporary neutrality, determined also the juridical content of perpetual neutrality. The inviolability of neutral territory does not permit belligerents to send troops or convoys of munitions of war through the territory of a neutral state. And, in virtue of the same convention (Art. X), "The fact of a neutral Power resisting, even by force, attempts to violate its neutrality cannot be regarded as a hostile act." Cf. "Neutrality of Belgium," in *North American Review* (New York, December, 1914), and E. Waxweiler, *La Belgique neutre et loyal* (Lausanne, 1915).

Respect for the Law of Neutrals. Respect for the law of neutrality can be assured in but two ways: for temporary neutrality, through the joint action of neutral Powers leagued for the defense of their rights; and, for permanent neutrality, through increasing the number of

guarantees of neutrality. Can a neutral protest against the lapse of another neutral from the law of neutrality? France in 1861, on the occurrence of the *Trent* affair between the United States and Great Britain, believed it her duty to address to the United States friendly representations with regard to maintaining "certain principles essential to the security of neutrals." That example might have been remembered, under certain circumstances of some 50 years later, with a view to showing that neutrals have the right, and perhaps the duty, of recalling belligerents to a respect for the laws of neutrality. However, the experience of the Great War would seem to show that truly to assure respect for European neutralities, such neutralities must have guarantees extending from Europe even to America. Without such a world-wide guarantee perpetual neutrality is doomed. See BLOCKADE; CONTRABAND OF WAR; DECLARATION OF PARIS; INTERNATIONAL LAW; LONDON, DECLARATION OF.

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NEUTRALITY, ARMED. See ARMED NEUTRALITY.

NEUTRALIZATION. See NEUTRALITY.

NEUTRAL NATION. An Iroquoian tribe formerly holding the territory along the north shore of Lake Erie in the Province of Ontario, and extending eastward as far as the Genesee River in New York. Their proper name is unknown. They were known to the Huron (see WYANDOT) as *Atiwendaron*, implying a people speaking a language slightly different (from Huron), and to the Seneca as *Gagwage-ono*. The French called them the Neutral Nation on account of their taking a neutral stand during the long wars between the Iroquois and the Huron. This did not save them, however, for on the final conquest and dispersion of the Huron people the Iroquois invaded the Neutral country, with the result that in 1651 the tribe was utterly destroyed, the remnant being incorporated with the conquerors or dispersed in small parties among the Western or Southern tribes. The final battle occurred at a fortified Neutral town about 6 miles south of the present Buffalo. See IROQUOIAN STOCK.

NEUTRALS. See NEUTRALITY.

NEUVILLE, nē'vēl', ALPHONSE DE (1836–85). A French military painter and illustrator. He was born at Saint-Omer (Pas-de-Calais), May 31, 1836, and died in Paris, May 20, 1885. His father, who was wealthy, wished his son to study law in preparation for an official position, but the boy, after attending the naval school at Lorient, and studying law for three years, determined to become a military painter. He went to Paris and took a studio of his own, studying a short time with Picot, but was more influenced by the art of Horace Vernet, Charlet, and Raffet. His first exhibited picture, "Batterie Gervais, Malakov" (1858), an episode from the Crimean War, achieved some success. Not being equally successful with later works, as a means of livelihood De Neuville designed a large number of illustrations for periodicals and books, including Guizot's *Histoire de France* and Claretie's *Histoire du drapeau*. His great success came after the Franco-Prussian War of 1870–71, in which he served as an officer of engineers. He became the most popular painter of that war, his pictures being greeted with great applause. From a purely artistic point of view they are open to criticism. His colors are sometimes dull and ill chosen; indeed, his drawings in black and white are more uniformly good than his paintings. He excels in portraying vividly and vigorously an intensely dramatic incident, and depicts soldiers in the thick of the fight with an accuracy and a sentiment that make the pictures national in spirit. As a draftsman, he is best known by his "Types of French Soldiers," published by Goupil & Co.

His early paintings include: "Capture of Naples by Garibaldi" (1860), "Chasseurs of the Guard" (1861), and "Attack in the Streets at Magenta" (1864), all in the Saint-Omer Museum; "Chasseurs Crossing the Tchernaia" (1868), Lille Museum. Among his later and more famous pictures, many of which are in the United States, are: "Bivouac before Le Bourget" (1872), Dijon Museum; "The Last Cartridge" (1873); "The Cemetery of St. Privat" (1880, Luxembourg); "Le Bourget" (1879) and "The Drummer," both in the Metropolitan Museum, New York; "The Adieu," bought by John Jacob Astor, New York; "Attack at Dawn," "In the Trenches," and "Information," all three in the Walters Gallery, Baltimore; "The Destruction of the Telegraph Line" (1884), David C. Lyall, New York. In 1881 De Neuville, in company with Detaille (q.v.), painted the celebrated cir-

cular panorama, "The Battle of Champigny," which was followed by that of "Rezonville." Consult De Lostalot, in *Gazette des Beaux-Arts*, vol. xxxii (Paris, 1885).

NEUVILLE, Jean Guillaume, Baron Hyde de (1776–1857). A French statesman, born at La Charité-sur-Loire. He displayed great loyalty to Louis XVI and Marie Antoinette, was one of the most active agents in the "emigration" from France, took part in the Royalist uprising of 1796, and after the 18th Brumaire attempted to persuade Bonaparte to recall the Bourbons. Being accused of having taken a part in the plot of the "infernal machine," he fled to Switzerland, and later went to the United States. Upon the restoration of the Bourbons, he returned to France, was Minister to the United States from 1816 to 1821, and was then Minister to Portugal. He was a member of the Chamber of Deputies from 1822 to 1830, and held the portfolio of the Marine in the ministry of Martignac. After the revolution of July, 1830, he withdrew into private life. His *Mémoires et souvenirs* were published in 1888.

NEUWIED, noi'vĕt. A town in the Rhine Province, Prussia, on the right bank of the Rhine, 7 miles northwest of Coblenz (Map: Prussia, B 3). The castle, residence of the Prince of Wied, stands in a beautiful park and has collections of Roman antiquities. Educational institutions include a Gymnasium and two seminaries for teachers. Sheet tin and iron are the main products, but bridge material, enamel, buttons, brushes, wool and cotton goods, soap, tobacco, starch, and chicory are also manufactured. Pop., 1900, 11,003; 1910, 19,104. Neuwied was founded in 1662 by the Prince of Wied, as a refuge for religious exiles, and many religious denominations are represented.

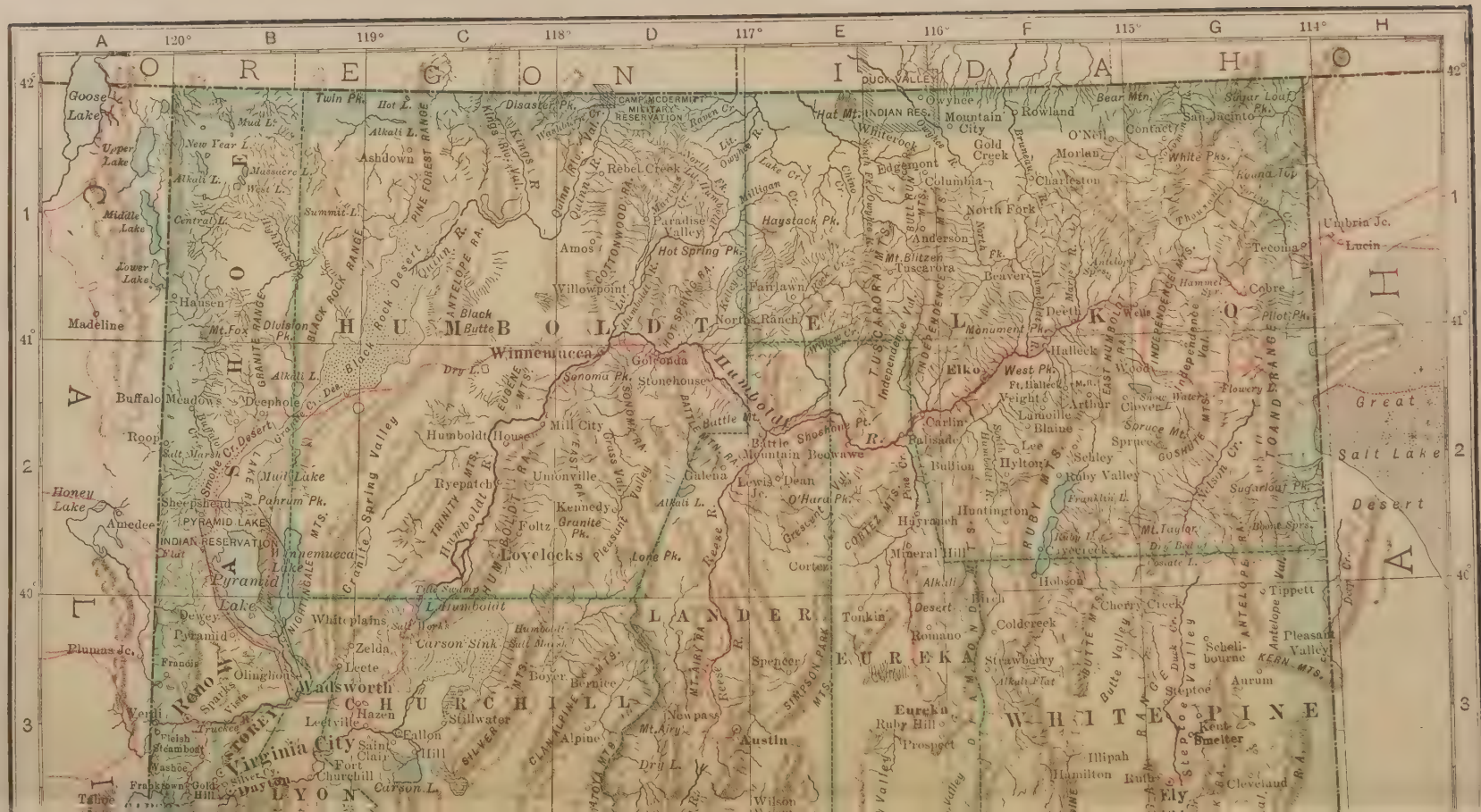
NEVA, nē'vȧ, *Russ. pron.* nyĕ-vȧ'. The outlet of Lake Ladoga (q.v.) in northwest Russia. It leaves the lake at its southwest end and flows westward for 45 miles, emptying through several mouths into the Gulf of Finland. The city of St. Petersburg is built on the islands of its delta, 9 miles from its mouth. It is the last link in the great waterway which through the Volga River and the Ladoga Canal system connects the Caspian Sea with the Baltic. Though the volume of water flowing through the Neva is very great, and the river is in places more than half a mile wide, sand banks prevent a passage, and its navigation has been made possible only by extensive engineering works, and an artificial channel, running through the shallow Bay of Neva, connects its mouth with the harbor of Kronstadt. During continued west winds the waters of the bay are piled up in the delta of the river, causing destructive inundations.

NEVADA, nĕ-vä'dȧ (Sp., signifying 'snow clad' or 'snowy land' and referring to the snow-covered mountains along the western border of the State). One of the Pacific coast group of the United States, popularly known as the Sagebrush State. It is separated from Oregon and Idaho on the north by the 42nd parallel of north latitude; from Utah and Arizona on the east by the 37th meridian west of Washington (long. 114° 1′ 34″ W.) and the Colorado River; and from California on the west and southwest by a line from the intersection of the 35th parallel and the Colorado River to the intersection of the 39th parallel and the 120th meridian west of Greenwich, and continuing along this meridian to the 42nd parallel. Nevada ranks sixth in area among the States of the Union and has an extreme length from north to south of 483 miles and an extreme breadth of 320 miles. Its area is 110,690 square miles, of which 869 square miles consist of water.

Topography. Nevada lies almost wholly within the Great Basin, a large area of interior drainage chiefly included between the Sierra Nevada and the Wasatch Mountains. In Nevada numerous mountain ranges from 7000 to 10,000 feet in height and up to 100 miles in length divide the State into a series of elongated parallel valleys running north and south. The valleys are filled to a depth of several hundred feet with the detritus washed from the mountains, and their level floors are from 4000 to 6000 feet above sea level. Most of the valleys are separated from each other by low divides, and with the exception of the Humboldt valley the State is divided into a large number of isolated basins by the mountain ranges. About half of the total area is included in the more level land of the valleys. The highest point in Nevada is Mount Wheeler (elevation 13,058 feet), near the centre of the eastern boundary, while the lowest point is in the Cañon of the Colorado, in the extreme southern point of the State, with an elevation of less than 700 feet.

Hydrography. Since the surface of Nevada is a series of basins surrounded by mountains and low divides, a very small part of it drains to the ocean. A few of the tributaries of the Snake River rise in the extreme northeastern corner and finally reach the Pacific Ocean through the Columbia River, and a portion of the extreme southern part drains into the Colorado River. Over the greater part of Nevada the streams flow only during the wet season, and their waters either are lost in the alluvium of the valleys or evaporate from the transient lakes formed on the level floors, leaving in the dry season hardened mud flats the lower portion of which is frequently covered with a dazzling white coating of salts. In the northern half of Nevada the slow melting of the snow on the mountains maintains more permanent streams. The Humboldt River is the largest of these and flows from east to west across the State into the Humboldt and Carson sinks, where the water evaporates. Several rivers rise in the Sierra Nevadas and flow into lakes and sinks in the west-central part. The chief of these are the Walker River, flowing into Walker Lake; the Carson River, flowing into the Carson Sink; and the Truckee River, flowing into Pyramid and Winnemucca lakes. Pyramid Lake is the largest body of water in Nevada and has a length of 31 miles, a breadth of 7 to 11 miles, and a depth of 380 feet. As none of the lakes have outlets, the water is brackish, containing about one-tenth as much salt as the ocean.

Climate. The dominant features of the climate are the low relative humidity and the large daily range in temperature. The rapid radiation, due to the dry air, cloudless skies, and high altitude, makes the nights cool even after the hottest summer days, and during the winter the temperature usually rises above freezing, even though it was below zero during the night. The average annual temperature is 49.6°, with a difference of six degrees between the northern and southern parts. About one


OREGON
IDAHO
CALIFORNIA
HUMBOLDT
LANDER
EUREKA
WHITE PINE
CHURCHILL
LYON
Winnemucca
Lovelocks
Battle Mountain
Austin
Eureka
Ely
Elko
Virginia City
Carson Sink
Humboldt Salt Marsh
Pyramid Lake
INDIAN RESERVATION
Humboldt R.
Reese R.
Carson R.
Quinn R.
Owyhee R.
Bruneau R.
Jarbidge R.
Goose Lake
Upper Lake
Middle Lake
Lower Lake
Honey Lake
Mud Lake
Alkali L.
Massacre L.
Summit L.
Central L.
Dry L.
Carson L.
Humboldt L.
Lake Cr.
Willow Cr.
Rock Cr.
Ranch Cr.
Pine Cr.
Duck Cr.
Antelope Valley
Great Salt Lake Desert
Black Rock Desert
Smoke Cr. Desert
Granite Range
Pine Forest Range
Kings River Mts.
Cottonwood Ra.
Antelope Ra.
Hot Spring Ra.
Trinity Mts.
Humboldt Ra.
Eugene Mts.
Sonoma Mts.
Battle Mt.
Shoshone Pt.
Independence Mts.
Tuscarora Mts.
Bull Run Mts.
Owyhee Mts.
Jarbidge Mts.
Goose Creek Mts.
Toano Range
Goshute Mts.
Wilson Cr. Mts.
Ruby Mts.
East Humboldt Ra.
Butte Mts.
Antelope Range
Schell Cr. Range
Snake Mts.
Egan Range
Schell Creek Range
Cherry Creek Range
Deep Creek Mts.
Confusion Range
Kern Mts.
Simpson Park Mts.
Mt. Airy Ra.
Augusta Mts.
Clan Alpine Mts.
Silver Peak Mts.
Gabbs Valley Range
Pilot Peak
Monument Pk.
Hot Spring Pk.
Haystack Pk.
Granite Pk.
Lone Pk.
Pleasant Valley
Grass Valley
Dixie Valley
Fairview Valley
Big Smoky Valley
Ruby Valley
Diamond Valley
Huntington Valley
Butte Valley
Steptoe Valley
Independence Valley
Thousand Springs Valley
Granite Spring Valley
Pahrum Pk.
Sheepshead Pk.
Sugarloaf Pk.
Mt. Taylor
Mt. Blitzen
Mt. Fox
Division Pk.
Sonoma Pk.
Disaster Pk.
Twin Pk.
Hot L.
Alkali L.
Massacre L.
New Year L.
Mud L.
Rebel Creek
Paradise Valley
Amos
Willowpoint
Hausen
Madeline
Buffalo Meadows
Deephole
Roop
Mud Lake
Pahrum Pk.
Amedee
Pyramid Lake
Nixon
Wadsworth
Reno
Verdi
Truckee
Sparks
Vista
Patrick
Steamboat
Washoe
Silver City
Gold Hill
Dayton
Fort Churchill
Saint Clair
Fallon
Stillwater
Hazen
Lee
Fernley
Olinghouse
Leete
Zelda
Whitepine
Pyramid
Plumas Jc.
Denver
Humboldt House
Mill City
Unionville
Kennedy
Foltz
Ryepatch
Galena
Golconda
Stonehouse
Winnemucca
Dry L.
Table Mountain
Lovelocks
Oreana
Imlay
Mill City
Toulon
Lovelock
Cortez
Mineral Hill
Hylton
Battle Mountain
Beowawe
Dean
Lewis
O'Hara Pk.
Crescent Valley
Palisade
Carlin
Elko
West Pk.
Ft. Halleck
Halleck
Weight
Arthur
Lamoille
Blaine
Clover
Spruce
Spruce Mt.
Snow Water
Flowery
Wood
Deeth
Welles
Cobre
Pilot Pk.
Tecoma
Lucin
Umbria Jc.
Contact
Rowland
Bear Mtn.
Sugar Loaf Pk.
San Jacinto
O'Neil
Morlan
Charleston
White Pks.
Kuna Ter.
Owyhee
Mountain City
Gold Creek
Columbia
Edgemont
Whitehorse
Hat Mt. Indian Res.
Anderson
North Fork
Beaver
Tuscarora
Fairlawn
Norris Ranch
Huntington
Hayranch
Jacks Cr.
Ruby Valley
Franklin L.
Schley
Ruth
Illipah
Hamilton
Prospect
Ruby Hill
Eureka
Smelter
Kent
Aurum
Strawberry
Alkali Flat
Scheli-bourne
Pleasant Valley
Tippett
Hobson
Cherry Creek
Coldcreek
Romano
Tonkin
Birch
Alkali
Desert
Spencer
Boyer
Bernice
Newpass
Alpine
Austin
Wilson
Mt. Airy
Dry L.
Prosper
Cleveland
Ely
Lucin
Tecoma
Umbria Jc.
Pilot Pk.
Monument Pk.
Hot Spring Pk.
Haystack Pk.
Granite Pk.
Lone Pk.

NEVADA
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80 90 100
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160
County Towns
Railroads
A 120° B 119° C 118° D Longitude 117° West E from 116° Greenwich F 115° G 114° H
DOUGLAS
LYON
MINERAL
ESMERALDA
NYE
LINCOLN
CLARK
ARIZONA
UTAH
Walker Lake
Mono Lake
Owens Lake
Death Valley
Mohave Desert
Amargosa Desert
Dry Lake
Carson Sink
Pahrump Valley
Sand Hill Pk.
Sugar Loaf Pk.
Gold Mt.
Clarks Pk.
Lookout Pk.
Shoshone Pk.
Mt. Anna
Sherman Pk.
Bald Pk.
White Mtn. Pk.
Gold Hills
Grapevine Mts.
Funeral Mts.
Telescope
Owens R.
San Joaquin R.
Mohave R.
Virgin River
Colorado R.
Gardnerville
Sheridan
Holbrook
Markleeville
Pinegrove
Sweetwater
Motelle
Hawthorne
Luning
Mina
Sodaville
Douglas
Rhodes
Bridgeport
Bodie
Mt. Braley
Belleville
Candelaria
Columbus Salt Marsh
Coaldale
Tonopah
Alpine
Mcsweeny Jc.
Goldfield
Klondike
Silverpeak
Columbia
Diamondfield
Dyer
Oasis
Palmetto
Lida
Benton
Mono Mills
Ashland
Bishop
Mariposa
Raymond
Berendo
Pollasky
Collis
Fresno
Redlands
Visalia
Independence
Keeler
Johannesburg
Barstow
Rhyolite
Beatty
Gold Center
Bull Frog
Forty Mile Canyon
Johnnie
Amargosa
Belmont
Morey
Hotcreek
Currant
Duckwater
Preston
Shoshone
Geyser
Patterson
Monument Canyon
Sunnyside
Cedar Ra.
Newland
Sharp
Reveille
Freiburg
Pioche
Ursine
Fay
Panaca
Escalante
Uvada
Crestline
Yeacham
Caliente
Minto
Acoma
Etna
Hiko
Delamar
Stine
Cana
Barclay
Boyd
Kyle
St. George
Carp
Vigo
Galt
Hoya
Mesquite
Bunkerville
Moapa Ind. Res.
Monpo
Logan
Overton
Ute
Drylake
Garnet
St. Thomas
Apex
Valley
Las Vegas
Ardon
Dard
Ripley
Goodsprings
Jean
Roach
Calada
Eldorado Canyon
Ivanpah
Leastalk
Manvel
Searchlight
Newberry Mts.
South Quartette
Pahrum
Manse
Spring Mt. Ra.
Muddy R.
Virgin Canyon
Meadow Valley Ra.
Arrow Canyon Mts.
Timpahute Ra.
Quinn Canyon Mts.
Grant Ra.
Golden Gate Ra.
Highland Ra.
Dock Val.
Elk Ra.
Lake Cr.
Railroad Valley
Pancake Range
Monitor Range
Kot Creek Range
Big Smoky Valley
Toiyabe
Shoshone
Toquima
Stokes Castle
Fish Lake Valley
Silver Canyon Mts.
Desert Mts.
Delamar Mts.
Meadow Valley Mts.
Mormon Range
Virgin Ra.
Kawich Ra.
Reveille Range
Pahranagat Ra.
Desert
Dry L.
Mud L.
Mud L.
Owens R.
Sonoma Mts.
Excelsior Mts.
Wassuk Range
Pilot Mts.
Gabbs Valley
Monte Cristo Mts.
Gilbert
Lida
Columbia
Mclean
Goldfield Jc.
Columbia
Sonoma
Silver Peak Mts.
Silver Peak Ra.
Kawich Ra.
Reveille Range
Pahranagat Ra.
Desert
Dry L.
Mud L.
Mud L.
Owens R.
Sonoma Mts.
Excelsior Mts.
Wassuk Range
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Gabbs Valley
Monte Cristo Mts.
Gilbert
Lida
Columbia
Mclean
Goldfield Jc.
Columbia
Sonoma
Silver Peak Mts.
Silver Peak Ra.

day in nine has a precipitation of .01 of an inch or more, and the rainfall is chiefly during the winter months. The average annual rainfall is 10 inches and is greatest on the mountains. Stations having different elevations may show a great difference in rainfall, even though a distance of but a few miles separates them. The dry, invigorating air and abundant sunshine make the climate of Nevada very pleasant and healthful.

Geology. East of a central north-and-south line the mountains are chiefly composed of Paleozoic sediments, while west of the line rocks of Mesozoic age are predominant. Throughout the State the lower elevations are remnants of volcanic flows of rhyolite, andesite, and basalts, together with lake sediments of Tertiary age. The valleys are deeply filled with detritus washed in from the surrounding mountains during the late Tertiary and Quaternary. Two periods of mountain building are recognized—the one at the close of the Mesozoic, which was accompanied by the intrusion of granites and diorites and which folded the rocks of pre-Cretaceous age; and the other which gave us the present mountains through the faulting of the crust into great tilted blocks at the close of the Tertiary. The ore deposits were formed at the time of the intrusion of the granites at the close of the Mesozoic and during the period of volcanic flows in the early Tertiary.

Mining. Though Nevada is essentially a metal-producing State, its importance as such is relatively smaller than during the days of the Comstock Lode (q.v.). This lode was developed in 1860, proving immensely rich in gold and silver. Between this year and 1890 its total production was $340,000,000, the year of the greatest output being 1877, when the production was valued at $38,000,000. After 1890 the output declined, the lode becoming apparently exhausted. This affected the industry, which decreased in importance until the remarkable discoveries, in 1906 and the years following, at Tonopah, Goldfield, and other places, when the State again became one of the leaders in the production of gold, silver, and copper. Copper, the most valuable product of the mines, did not assume importance until 1908, although it had been produced since 1873. Nevada, in 1913, ranked fifth among the States in the production of this metal. In that year the copper produced amounted to 90,693,751 pounds, valued at $14,057,531.

Nevada ranked in 1914 first among the States in the production of silver and fourth in that of gold. The production of silver in 1913 amounted to 16,090,088 fine ounces, valued at $9,718,410. In 1914 the value of the product was $9,457,100. In 1913 there were produced 570,589 fine ounces of gold, valued at $11,795,130. In 1914 the gold product was $11,977,400. Lead and zinc are the only other metals produced in considerable quantities. The lead produced in 1913 amounted to 8172 short tons, and was valued at $719,137. The production of zinc was 7210 short tons, valued at $807,502. In addition to the metals mentioned, other minerals produced are clay products, lignite coal, occasional gems, graphite, gypsum, infusorial earth, iron ore, lime, mineral waters, quicksilver, salt, sand, gravel, stone, sulphur, and tungsten. The total production of minerals in 1913 was valued at $37,842,084.

Agriculture. Of a total land area of approximately 70,285,440 acres, there were, in 1910, 2,714,757 acres, or 3.9 per cent, in farms, and in several counties in the southeast this percentage was less than one. The improved land in farms amounted to 752,117 acres. The average size per farm in 1910 was 1009 acres. The total value of property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, was $60,399,365.

One of the unusual characteristics of Nevada is the great area of arid land utilized, if at all, for grazing purposes only, upon which there are some very large farms or ranches, from 50,000 to 100,000 acres in extent.

Of the total number of farms in 1910, 2356 were operated by owners and managers and 333 by tenants. The foreign-born white farmers, in 1910, numbered 867, and the negro and other nonwhites 161. Of nonwhites, 148 were Indians, the rest Chinese and negroes.

The following table gives the acreage, production, and value of important crops as estimated for 1914 by the United States Department of Agriculture.

CROPS	Acreage	Prod. in bus.	Value
Wheat	45,000	1,322,000	$1,266,000
Oats	13,000	676,000	372,000
Barley	13,000	611,000	397,000
Potatoes	12,000	1,560,000	1,092,000
Hay	247,000	*803,000	6,665,000

* Tons.

Hay and forage is by far the leading crop, and in 1909 had an acreage of 350,538. The production was 521,918 tons, valued at $4,185,071. Potatoes, the next important crop, had an acreage of 4864 in that year, and a production of 766,826 bushels, valued at $396,652. There were produced in that year 396,075 bushels of wheat, valued at $396,285. The acreage was 14,260. In that year there were also harvested 412,149 bushels of barley and 334,973 bushels of oats. The production of barley was valued at $310,394, that of oats at $191,968, and the acreage devoted to each was 12,200 and 7853 respectively.

The total value of crops in 1909 was $5,924,000 and their combined acreage 392,387. The total acreage of potatoes and other vegetables was 6882 and their value $661,803. Excluding potatoes, sweet potatoes, and yams, the acreage of vegetables was 1952 and their value $264,000. The production of orchard fruits in 1909 amounted to 86,576 bushels, valued at $82,695, of which apples composed 74,449 bushels, valued at $66,097. The most important of the small fruits were raspberries, loganberries, gooseberries, and strawberries.

Live Stock and Dairy Products. Grazing is the most important of the agricultural industries. The domestic animals on the farms in 1910 were valued at $19,071,809. On Jan. 1, 1915, the estimated number of cattle other than milch cows was 450,000, valued at $18,315,000; milch cows numbered 24,000, with a value of $1,860,000; horses, 78,000, valued at $5,382,000; mules, 3000, valued at $237,000; sheep, 1,532,000, valued at $7,507,000; swine, 36,000, valued at $418,000. The total number of fowls of all kinds in 1910 was 133,217, valued at $93,668; the total value of milk, cream, and butter fat sold and butter and cheese made,

$518,179; milk sold, 1,192,833 gallons, valued at $219,554; and the butter made, 403,885 pounds, valued at $121,649.

Irrigation. Nevada is the most arid State in the Union. Of the 2689 farms in 1910, 2406, or 89.5 per cent, were irrigated. The acreage irrigated was 701,833 acres, or 93.3 per cent of the improved land in farms. The total length of irrigation ditches completed was 3151 miles. The irrigation plants existing in 1910 were capable of supplying water to 840,962 acres, and the total acreage included in projects completed or under way in 1910 was 1,232,142 acres. The estimated final cost of all enterprises in 1910 was $12,188,756. The most important of the projects undertaken by the United States government is the famous Truckee-Carson project, in which in 1913 there was a net investment of $5,029,519. This project has redeemed over 200,000 acres of land. See GREAT AMERICAN DESERT.

Manufactures. Nevada is the least important of the States as regards manufactures. The following table gives the most important data relative to manufactures for 1909 and 1904.

SUMMARY FOR 1909 AND 1904

THE STATE — LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries	1909	177	2,650	2,257	$9,807	$1,982	$11,887	$3,521
	1904	115	1,016	802	2,892	693	3,096	1,468
Bread and other bakery products	1909	29	86	47	147	54	356	142
	1904	11	48	31	39	28	127	63
Butter, cheese, and condensed milk	1909	9	25	16	102	15	15	37
	1904	4	11	10	57	9	197	36
Cars and general shop construction and repairs by steam-railroad companies	1909	9	857	818	607	610	1,033	696
	1904	6	340	315	251	280	532	310
Flour-mill and gristmill products	1909	8	39	24	592	24	598	102
	1904	9	31	17	411	16	521	89
Lumber and timber products	1909	9	224	186	774	143	503	215
	1904	5	162	147	1,072	110	528	271
Printing and publishing	1909	54	276	180	654	193	519	406
	1904	29	121	67	168	64	253	220
All other industries	1909	59	1,143	986	6,931	943	8,552	1,923
	1904	51	303	215	894	186	938	479

Of the total number of wage earners in 1909, 26 were women. The wage earners of 16 years of age and under numbered only 9.

Transportation. Two railroads cross the northern half from east to west, and several lines traverse the southern part. The total mileage in 1914 was 2412. The chief roads and their mileage follow: Central Pacific, 746 (operated by the Southern Pacific); Western Pacific, 427; San Pedro, Los Angeles, and Salt Lake, 267; Las Vegas and Tonopah, 200; Nevada Northern, 165; Tonopah and Goldfield, 110. The water transportation is negligible.

Banks. A national bank was organized in 1866, but soon closed. The First National Bank of Winnemucca, organized in 1886, was the only national bank in 1900. On Sept. 12, 1914, there were 10 national banks with a combined capital of $1,410,000; surplus, $306,000; deposits, $5,743,000; cash, etc., $663,000; loans, $5,190,000. On June 30, 1914, there were 19 State banks with a capital of $1,473,800; surplus, $388,003; cash, etc., $672,221; loans, $5,945,381.

Government. The constitution, adopted in 1864, has been amended in important respects. Amendments may be proposed by either the Senate or Assembly, but must be agreed to by a majority of both Houses of two succeeding Legislatures before being submitted to the people, and if approved by a majority of the voters, become part of the constitution.

Legislative.—The Legislature, consisting of the Senate and an Assembly, meets biennially, the sessions beginning on the third Monday in January next following the election of the members of the Assembly. Senators hold office for four years, the members of the Assembly for two. The initiative and referendum have been adopted and are in full force.

Executive.—The supreme executive power is vested in the Governor, who must have attained the age of 25 years. The other executive officers are Lieutenant Governor, Secretary of State, Treasurer, Comptroller, Inspector of Mines, Superintendent of Public Instruction, Surveyor-General, and Attorney-General. The Governor, Secretary of State, and Attorney-General constitute a Board of State Prison Commissioners and a Board of Examiners with power to examine all claims against the State.

Judiciary.—The judicial power is vested in a supreme court, district courts, and justices of the peace. The supreme court consists of a Chief Justice and two associate justices, who are elected and hold office for a term of six years. The State is divided into nine judicial districts, for each of which a district judge is elected for four years.

Suffrage and Elections.—Every male or female citizen of the United States of the age of 21 years and upward, who has resided in the State six months, and in the district or county 30 days, next preceding any election, is entitled to vote. Voters are required to pay an annual poll tax, to be expended for the maintenance and betterment of public roads. Every public officer in the State is subject to recall from office by the qualified electors of the State or the county, district, or municipality from which he is elected. General elections are held on the Tuesday next after the first Monday of November, beginning with 1916 and every two years thereafter. There are severe penalties for bribery, intimidation, or other crimes against the electorate.

Statutory and Miscellaneous Provisions.—There are a Tax Commission and a Bureau of Industry, Agriculture, and Irrigation. An eight-hour-day law applicable to plaster and cement work is in force. A workman's compensation law has been adopted. There are also a juvenile court, a child labor law, and a compulsory-education law. The State has a food and drugs act and a law forbidding faro and other forms of gambling. A corrupt-practices act limits the campaign expenses to 20 per cent of one year's salary.

Finances. On admission to statehood, in 1864, Nevada had a public debt of $400,000 (offset by State and Government bonds held in excess of this total), which in the following decade grew to $733,528. This debt was in 9 and 10 per cent bonds, the prevailing rate of interest at that time. The income was derived partly from a tax on property, partly from a special tax on the proceeds of the silver mines. The income from this special tax grew rapidly with the output of the mines; in 1874 it amounted to 28 per cent of the total receipts of the State treasury, and in 1878 to 50 per cent, or about $250,000. The output of the mines rapidly declined in the eighties, and with it the income from this source. The funded debt on Dec. 31, 1912, was $614,000. It consisted of $234,000 in bonds and $380,000 in nonnegotiable certificates of indebtedness. All of this indebtedness is due to the State school fund, to which the annual interest is paid. The State also holds in trust for its educational fund bonds of other States or counties amounting to $1,765,000, the interest being paid into this fund. The floating debt, consisting entirely of outstanding warrants, amounted to $56,759. There was in the same year a sinking fund of $63,064. The total per capita debt was $6.70. The bonded debt at the end of the fiscal year 1913 was $680,000. At the beginning of the fiscal year 1914 there was a balance in the treasury of $449,404. The receipts for the year amounted to $881,538, and the disbursements to $1,073,114, leaving a balance on hand of $257,828.

Population. Nevada is the most sparsely settled State of the Union. The following are the figures by decades: 1860, 6857; 1870, 42,491; 1880, 62,266; 1890, 47,355; 1900, 42,335; 1910, 81,875. The est. pop. in 1914 was 98,726; 1920, 77,407. The population per square mile in 1910 was 0.7, and the urban population (places of 2500 or more), 13,367. The native white population in 1910 numbered 56,277; the foreign-born whites, 17,999; Indians, 5240; Chinese, 927; Japanese, 864; and negroes, 513. The greater part of the foreign-born population came from Italy. The males in 1910 numbered 52,551, the females 29,324, the males of voting age 40,026, the males of militia age 29,383. The only city with a population of 8000 or more in 1910 was Reno, with 10,867 in that year and an estimated population in 1914 of 13,579. The other cities with their populations in 1910 are as follows: Virginia City, 2244; Carson City, the capital, 2456; Tonopah, 3900; Goldfield, 4838; Ely, 2055.

Education. The chief educational problem of Nevada is the proper administration of a school system covering a wide and thinly populated area. Of a total school population of 16,132, in 1910, 10,141 attended school. There were in the same year 4702 illiterates of 10 years of age or over—6.7 per cent of the entire population. According to the Superintendent of Public Instruction the children of school age in 1910 numbered 13,523, the total school enrollment was 11,710, the average daily attendance 8552. There were 327 elementary schools, 21 district high schools, and 14 county high schools. Teachers numbered 576, of whom 480 were females and 96 males. The average monthly salary paid to male teachers was $96.81, to female teachers $81.85. The school fund, coming largely from the sale of public lands, amounted in January, 1914, to $2,471,771. The total expenditure from the county funds for the year ending June, 1914, was $659,659.

Manual training was conducted in 1914 in six high schools and nine elementary schools, and some form of industrial art has been introduced into 50 or more rural schools. Agriculture is taught in several high schools and in a few elementary schools. Teachers' institutes are held each year in each of the districts, and a State institution in one of the larger cities. County normal schools are situated at Eureka, Yerington, and Tonopah. The State University at Reno is the only institution of collegiate rank. Virginia City Mining School is at Virginia City. There are several schools where industrial training is given to the Indian students.

Charities and Corrections. The charitable and correction institutions include the Hospital for Mental Diseases at Reno, the Orphans Home and the State Prison at Carson City, and the Nevada School for Industry at Elko. The Crittenton Home for Girls at Reno receives aid from the State, but is not under State control. Convicts in the State prison may be detailed for work on roads, and for each month of such service may be allowed 10 days' extra time off and 25 cents for each working day. The deaf, blind, and feeble-minded are for the most part placed in institutions in California. The training of male juvenile delinquents is carried on at the Nevada School of Industry opened June 15, 1915, while the female juvenile delinquents are sent to institutions of adjoining States.

Religion. The Roman Catholics, including over 20 per cent of the total population, are more than three times as numerous as all of the Protestant bodies combined. The more important Protestant bodies are the Episcopal, the Methodist, the Presbyterian, and the Baptist. In numbers Mormons rank after the Episcopalians.

History. The territory from which Nevada was formed was acquired from Mexico by the Treaty of Guadalupe Hidalgo, Feb. 2, 1848, and later formed part of Utah Territory. The first European known certainly to have entered the

region was Francisco Garcés, a Franciscan friar, on his way to California from Sonora, in 1775. In 1825 Peter S. Ogden, in the employ of the Hudson's Bay Company, worked inland with a small party and came upon the Humboldt River, sometimes called the Ogden River after himself, or the Mary River after his Indian wife. Other trappers came within the next five years, though they suffered from the attacks of Indians. In 1826 Jedediah S. Smith crossed the entire breadth of the present State from west to east. In 1849 the Mormons founded a trading post in the valley of the Carson River, near the present town of Genoa, to supply gold seekers on their way to California. When Utah Territory was formed, Sept. 9, 1850, the western boundary was fixed as the summit of the Sierra Nevada Mountains and so included much of the present State, but the territorial organization did not extend at once to the extreme west, and the inhabitants organized a government of their own. In 1853, and again in 1856, the inhabitants of the Carson valley petitioned to be annexed to California, claiming that the government of Utah did not protect them and had even withdrawn the county government, so tardily given. In 1858 a provisional government was formed at Carson City with Isaac Roop as Governor. The Comstock Lode was discovered in June, 1859, and miners flocked thither from every direction. The new Territory was separated from Utah, March 2, 1861, being bounded on the east, however, by the 116th meridian. Another degree was cut from Utah, July 14, 1862, and on May 5, 1866, the eastern boundary was extended nearly to the 114th meridian and that part of the State below 37° was taken from Arizona. In September, 1863, an election was held for delegates to form a State constitution, but the instrument submitted was defeated in January, 1864. However, the political situation made two additional Republican votes in the United States Senate exceedingly desirable, and Congress, in March, 1864, again passed an enabling Act; in July the constitution was accepted, and the State was admitted on October 31. The State was Republican in national elections until 1892, when it was carried by the People's party. In the 1896, 1900, 1908, and 1912 presidential elections it voted for the Democratic candidates, but was carried by Roosevelt in 1904.

The State was so greatly disturbed in 1906–08 by strikes in the gold mines at Goldfield and other points that it was found necessary to send United States troops to preserve peace. (See Strikes.) At the presidential election of November, 1908, Bryan received 11,212, Taft 10,777, and Debs 2203 votes. A Democratic Legislature was elected. The Legislature of 1909 passed several measures preventing Japanese from owning land in the State. In January of that year Francis G. Newlands was reëlected to the United States Senate. In 1910 Tasker L. Oddie, Republican, was elected Governor. George D. Nixon, Republican, received the preferential vote for the United States Senate. Senator Nixon died in 1912, and the Governor appointed W. A. Massey, former Chief Justice of the Supreme Court, to fill out his term. In the presidential election of that year Wilson received 20,437, Taft 17,733, Roosevelt 8347, and Debs 2859 votes. A Democratic Legislature was elected. The Legislature of 1913 made more stringent the divorce law, which up to that time had been very lax. This law, becoming effective on Jan. 1, 1914, was practically repealed the next year. In the State elections held in 1914 the Democrats elected E. D. Boyle Governor. Senator Newlands was reëlected United States Senator. An amendment providing for woman suffrage was also adopted at this election.

The Governors of Nevada have been as follows:

TERRITORIAL

James W. Nye		1861–64

STATE

Henry G. Blasdell	Republican	1864–70
Louis R. Bradley	Democrat	1870–79
John H. Kinkead	Republican	1879–83
Jewett W. Adams	Democrat	1883–87
Christopher C. Stevenson	Republican	1887–90
Frank Bell	"	1890 91
Roswell K. Colcord	"	1891–95
John E. Jones	Silver	1895–96
Richard Sadler	"	1896–1903
John Sparks*	Silver-Democrat	1903–06
D. S. Dickerson	Democrat	1907–10
Tasker L. Oddie	Republican	1911–14
E. D. Boyle	Democrat	1915–

* Died in office.

Consult: Angel, *History of Nevada* (Oakland, 1881); Bancroft, *Nevada, Colorado, and Wyoming* (San Francisco, 1890); *Nevada and her Resources* (Carson City, 1894).

NEVADA. A city and the county seat of Story Co., Iowa, 35 miles north by east of Des Moines, on the Chicago, Rock Island, and Pacific and the Chicago and Northwestern railroads (Map: Iowa, D 2). It is the centre of a farming and cattle-raising district, and has a large cold-storage plant for butter and eggs, and some manufactures, the chief products being tile and brick, furnaces, eveners, automobile trucks, plows, candy, cement posts, auto tire gauges, and flour. The city maintains the Iowa Sanitarium, Oak Park Academy, and a public library, and it owns the water system. Pop., 1900, 2472; 1910, 2138; 1915 (State census), 2681.

NEVADA. A city and the county seat of Vernon Co., Mo., 103 miles by rail south of Kansas City, on the Missouri Pacific and the Missouri, Kansas; and Texas railroads (Map: Missouri, B 4). It has a Roman Catholic convent school, a State hospital for the insane, the Weltmer Institute of Suggestive Therapeutics, and Cottey College for Young Ladies (Methodist Episcopal, South), opened in 1884. A prominent feature of the city is Radio Springs Park, containing mineral springs which have medicinal properties. The Spring of Pawhuska is also of interest. Nevada controls considerable trade in the products of the agricultural and stock-raising district of which it is the centre, and has large zinc smelters, iron works, a foundry, and saw, planing, flour, and feed mills. Nevada was incorporated in 1870. It is governed by a mayor and a unicameral council. Pop., 1900, 7461; 1910, 7176.

NEVADA, Emma (Emma Wixom) (1862–). An American dramatic soprano, born in Austin, Nev. She studied under Marchesi in Vienna and afterward in Italy. She first appeared in opera in London (1880) with Marie Van Zandt and subsequently sustained leading parts in Triest, Pesth, Prague, Milan, Rome, Naples, and Paris, making her first professional tour of the United States in 1884–85. She had a wide repertoire, which included almost all the great coloratura parts and many parts demanding pathos.

NEVADA CITY. A city and the county seat of Nevada Co., Cal., 166 miles northeast

of San Francisco; the terminus of the Nevada County Narrow Gauge Railroad (Map: California, D 3). It is a popular health and summer resort, being esteemed for its equable climate and for its fine site, at an elevation of 2500 feet in a mountainous region. The city contains a Carnegie library, county courthouse, high school, and an Elks Home. Near by are valuable gold mines, Nevada County being the leading gold-mining county in California. The leading occupations are gold, quartz, and placer mining, horticulture, farming, truck gardening, and dairying. Under a charter of 1885 the government is vested in a president and board of trustees elected on a general ticket. The city owns and operates the water works. Nevada City was first settled in 1849, and in 1850–51 was the most important mining town in the State. It was incorporated in 1875. Disastrous fires occurred in 1851, 1856, 1858, and 1863. Pop., 1900, 3250; 1910, 2689.

NEVADA STATE UNIVERSITY. A State university for higher education founded at Elko in 1873. In 1875 it was removed to Reno, and was formally reopened in the following year. The university is the head of the educational system of the State and is the only institution of collegiate grade within its borders. It comprises the college of agriculture, including the school of home economics and the division of agricultural extension; the college of arts and sciences; the college of engineering, including the Mackay school of mines, school of mechanical and electrical engineering; the department of education of the summer season for teachers. Military instruction forms part of the curriculum, and a uniform is worn by students in military work. The degrees conferred by the university are A.B., S.B., A.M., S.M., and mining, mechanical, and civil engineer. The total enrollment in all departments in 1915 was 388, and the faculty numbered 56. The library contains about 30,000 volumes. The university covers 53 acres, and its property was valued in 1915 at $523,268. The income from all sources in that year was about $200,000. The president in 1915 was Archer W. Henry.

NEVADITE. See RHYOLITE.

NÉVÉ, nā′vā′. See GLACIER.

NEVERS, *ne-vâr′*. The capital of the Department of Nièvre, France, and formerly of the Province of Nivernais, situated on a hill in the midst of fertile plains at the confluence of the Loire and the Nièvre, 140 miles southeast of Paris (Map: France, N., J 6). The old portion of the town is ill built, with narrow, crooked streets, but the later portion is more modern and has a large park. A gateway, containing a Gallo-Roman museum, and two towers are preserved remains of the mediæval fortifications. The feudal ducal castle is utilized for the Palace of Justice and also contains a ceramic museum. The chief ecclesiastical buildings are the Romanesque eleventh-century church of St. Etienne and the restored cathedral of St. Cyr, built in the thirteenth century on the site of a prior church, the west portion of which is incorporated in the present building. The cathedral is noted for its double apse and fine sculptures and paintings. The town possesses a public library of 30,000 volumes, a teachers' training college, an ecclesiastical seminary, and an art school. It has manufactures of iron and copper ware, chemicals, porcelain, cloth, glue, shoes, fur garments, dyes, rope, and agricultural implements, an engine-fittings factory, formerly a famous naval cannon foundry, and oil mills. Near by are found earths used in faïence. Eight miles northwest is the watering place Pougues-les-Eaux. Nevers is the ancient Noviodunum, an important town of the Ædui. It has been an episcopal see since the sixth century, when it was called Nivernum. The town became the seat of the counts of Nevers in the tenth century and was created a dukedom by Francis I in 1538. The Dukedom of Nevers passed by marriage to a member of the family of Gonzaga, the ducal house of Mantua. On the extinction of the Gonzaga line in Mantua in 1627, Charles, Duke of Nevers, claimed the duchy. He was supported by France and opposed by Spain and Austria. The War of the Mantuan Succession which ensued ended in the recognition of the claim of Charles of Nevers in 1630. Pop., 1901, 27,673; 1911, 27,706.

NEV′ERSINK HIGHLANDS. A range of hills in New Jersey. See NAVESINK HIGHLANDS.

NEVIANSKY-ZAVOD, *nĕv-yän′skė-zà-vôt′*. A mining settlement in the Government of Perm, Russia, situated on the Neiva, in the Ural Mountains, 62 miles north of Ekaterinburg. It is the centre of an important mining district and contains extensive ironworks, steel mills, and gold washeries. The settlement was founded in 1699. Pop., 1897, 16,066; 1910, 17,500.

NEV′ILLE, GEORGE (c.1432–76). An English divine. He was educated at Balliol College, Oxford. Through the influence of his father, the Earl of Salisbury, then Chancellor of England, and of his brother, the Earl of Warwick (q.v.), his preferment was rapid. From 1453 to 1457 he was Chancellor of Oxford University, he became Bishop of Exeter in 1458, and was appointed Archbishop of York in 1464. Participating in the stormy politics of the time, and one of the Yorkist peers who placed Edward IV on the throne, Neville was rewarded in 1460 with the chancellorship of England. He was deprived of his high office in 1467, and, when Warwick revolted against the King in 1469, the latter was a prisoner in Neville's hands for a short time, but was permitted to escape. During the short reign of Henry VI in 1470–71 he held the chancellorship, but surrendered himself and Henry to Edward after the latter had returned from Holland and defeated Neville's brother, Warwick, at Barnet. He was imprisoned in the Tower for a short time, was pardoned, but was again imprisoned in 1472–75 in France on a charge of treason.

NEVILLE, RICHARD, EARL OF WARWICK. An English political leader known as the Kingmaker. See WARWICK, RICHARD NEVILLE, EARL OF.

NEVILLE'S CROSS, BATTLE OF. A battle between the Scotch and the English, fought on Oct. 17, 1346. During the Hundred Years' War (q.v.) the Scotch were the firm allies of the French, and, when Edward III invaded France, King David II of Scotland prepared to harass England. He was met, however, at Neville's Cross, near Durham, by the English under Henry Percy and Ralph Neville. The English, owing to their archers, were completely victorious, and David himself was captured. See BRUCE, DAVID.

NEV′IN, ARTHUR FINLEY (1871–). An American composer, brother of Ethelbert Nevin. He was born at Vineacre, Edgeworth, Pa., was educated at Sewickley (Pa.) Academy and at Park University (Allegheny, Pa.), and studied

at the New England Conservatory of Music in Boston in 1891–95 and then at Berlin under Klindworth and Boise. His compositions include: a book of four *May Sketches; Pierrot's Guitar;* and the songs *Were I a Tone, In Dreams,* and *Free as the Tossing Sea.* His North American Indian opera, *Poia,* was produced at the Royal Opera of Berlin in 1910.

NEVIN, ETHELBERT (1862–1901). An American composer, brother of A. F. Nevin. He was born at Edgeworth, Pa. After thorough preparation under local music teachers he went to Berlin (1884) and became a pupil of Von Bülow and Karl Klindworth, the former of whom particularly encouraged his natural gift for composition. He returned to Boston in 1887 and settled there, devoting himself largely to composition, but after 1893 he spent much of his time in Europe, mostly in Paris, the south of France, Italy, and Algiers. He returned to America in 1900 and became associated with H. N. Parker in the department of music at Yale University. He was the composer of many songs, instrumental pieces, and waltzes, almost all of which are marked by delicacy. He died at New Haven, Conn. Consult V. Thompson, *The Life of Ethelbert Nevin* (Boston, 1913).

NEVIN, JOHN WILLIAMSON (1803–86). An American clergyman. He was born in Franklin Co., Pa., graduated from Union College in 1821, studied theology at Princeton, and taught Hebrew there from 1826 to 1828. From 1829 to 1840 he was professor of Hebrew and biblical literature in the Western Theological Seminary at Allegheny, Pa. From here he went to the theological seminary of the Reformed (German) church at Mercersburg, where he taught theology until 1851. He was president of Marshall College, Mercersburg, from 1841 to 1853. After this institution had united with Franklin College at Lancaster under the name of Franklin and Marshall, he served as president from 1866 to 1876. He was one of the founders of the Mercersburg theology (q.v.). He was the editor of and principal contributor to the *Mercersburg Review* from 1849 to 1853. He published: *Biblical Antiquities* (2 vols., 1828; rev. ed., 1849); *The Anxious Bench* (1842); *The Mystical Presence* (1846); *History and Genius of the Heidelberg Catechism* (1847); *Anti-Christ; or, the Spirit of Sect and Schism* (1848). Consult his biography by Appel (Philadelphia, 1889).

NEVIS, nē'vis. One of the Leeward Islands in the West Indies, belonging to Great Britain. It lies 2 miles southeast of St. Christopher, with which it is administratively connected (Map: West Indies, G 3). Area, 50 square miles. It consists largely of an extinct volcano, 3596 feet high and wooded at the summit. The lower slopes are fertile and well cultivated, producing sugar cane and some limes and oranges. Pop., 1901, 12,774; 1911, 12,945. The chief town is Charlestown (q.v.). The island was discovered by Columbus in 1498 and was colonized by the English in 1628. In 1899 it suffered from a disastrous hurricane. Nevis was the birthplace of Alexander Hamilton.

NEVIS, BEN. See BEN NEVIS.

NEVSKI, ALEXANDER. See ALEXANDER NEVSKI.

NEVSKI (nyĕf'skē) **PROSPEKT'.** The chief street of St. Petersburg, extending for about 3 miles in a straight line and faced by some of the finest shops and public buildings of the city.

NEW, JOHN CHALFANT (1831–1906). An American politician, born at Vernon, Ind. He graduated at Bethany College (West Virginia) in 1851 and settled in Indianapolis, where he was admitted to the bar in 1852. Throughout the Civil War he served as quartermaster-general of Indiana. In 1862 he was also a member of the Indiana State Senate. For some years after 1865 engaged in banking, in 1875 New was appointed Treasurer of the United States by President Grant, and in 1882 President Arthur appointed him Assistant Secretary of the Treasury. He was active in securing the nomination and election of Benjamin Harrison to the presidency in 1888 and the next year was appointed Consul General in London. This office he held until 1892. In later years he was proprietor of the Indianapolis *Journal.*

NEW ACADEMY. A school of Greek philosophers, the successors and expositors of Plato. The various schools classed under the name of the Academy are differently divided by modern historians. The third school, headed by Carneades (q.v.), is sometimes referred to as the New Academy, though it is perhaps more often classed, with the second, under the name of Middle, the New beginning a little later with Philo of Larissa, who founded the fourth school. See ACADEMY.

NEW ALBANY. A city and the county seat of Floyd Co., Ind., on the north bank of the Ohio River, 2 miles below the falls and opposite Louisville, Ky., with which it is connected by a very long steel railroad bridge, and on the Southern, the Chicago, Indianapolis, and Louisville, the Baltimore and Ohio Southwestern, and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads (Map: Indiana, F 8). It has a fine courthouse, post office, and customhouse, Scribner's Park, St. Edward's Hospital, and a public library. In the suburbs there is a national cemetery which contains 2908 graves, 676 of unknown dead. The city controls large commercial interests and is an important manufacturing centre, having tanneries, automobile and furniture factories, engine and boiler works, rolling and planing mills, iron foundries, a rug factory, and pork-packing establishments. Clay is found in the vicinity. New Albany was laid out in 1813 and incorporated as a city in 1839, the charter of that year being still in operation and providing for a mayor, chosen every four years, and a unicameral council, which elects subordinate municipal officers. Pop., 1900, 20,628; 1910, 20,629; 1920, 22,992.

NEW ALBION. See ALBION, NEW.

NEWALL, nū'ăl, HUGH FRANK (1857–). An English astronomer, born at Gatehead-on-Tyne, where his father, Robert Stirling Newall, had a private observatory. The son was educated at Rugby and at Trinity College, Cambridge, from 1886 to 1890 was assistant in physics at Cambridge, and then became professor of astrophysics and director of the solar physics observatory, using the large equatorial telescope given the university by his father in 1891. Besides technical papers he wrote a popular manual, *The Spectroscope and its Work* (1910).

NEW ALMADEN, ăl'mā-dēn'. A village in Santa Clara Co., Cal., 13 miles south of San José. The famous old Almaden mine, with the largest total production to date of all United States quicksilver producers, is located here. The value of its product since 1848 is estimated at $60,000,000. Pop., 1915 (local est.), 140.

NEW AMSTERDAM. The name of New York City (q.v.) under the Dutch.

NEW ARAD. See ARAD.

NEW ARCHAN'GEL. The former name of Sitka (q.v.).

NEWARK, nū'ĕrk, or **NEWARK-UPON-TRENT.** A municipal borough and market town of Nottinghamshire, England, on the Devon, a navigable branch of the Trent, 16 miles southwest of Lincoln (Map: England, F 3). Newark is one of the most important malting towns in England and has flour mills, breweries, manufactories of iron, brass, plaster of Paris, agricultural implements and boilers, gypsum and limestone quarries, and a trade in corn, malt, and flour. The corn market is one of the largest in the Kingdom. The parish church of St. Mary, a large and elegant edifice, though often rebuilt, still shows traces of its original Norman character. The grammar and song school was founded in 1529. There are also the town hall, corn exchange, library, and mechanics' institute. Newark was incorporated in the reign of Edward VI and received further charters from Charles I and Charles II. The town owns the water works and markets and maintains public baths. It dates from the Roman occupation. The castle, now in ruins, was built early in the twelfth century. King John died in it in 1216. From its position and great strength it was called the Key of the North and during the Civil War sustained three sieges for Charles I, finally surrendering at his request to the Scots in 1646. Pop., 1901, 14,992; 1911, 16,408. Consult Cornelius Brown, *Annals of Newark-upon-Trent* (London, 1879).

NEWARK. A town in Newcastle Co., Del., 12 miles west by south of Wilmington, on the Baltimore and Ohio and the Philadelphia, Baltimore, and Washington railroads (Map: Delaware, H 1). It is the seat of Delaware (State) College (q.v.), Delaware Agricultural Experiment Station, the Women's College of Delaware, established in 1914, and State Board of Health Laboratories. There are paper manufactures, wall-paper mills, fibre works, machine shops, etc. The water works and electric-light plant are owned by the municipality. Pop., 1900, 1213; 1910, 1913.

NEWARK. The metropolis of New Jersey, county seat of Essex County, and a port of entry, extending from the Elizabeth city line north 3 miles along the west bank of Newark Bay to the mouth of the Passaic River and 7½ miles up the river to Belleville; located 8 miles west of the Hudson, on the Pennsylvania, Lehigh Valley, Central of New Jersey, Lackawanna, and Erie railroads, in lat. 40° 41′ N. and long. 74° 10′ W. (Map: New Jersey, D 2).

The city's area is 23.4 miles. It is fairly level for about a mile from the water front, when the ground rises in a series of plateaus. Beyond these, north, west, and southwest, are a cluster of smaller municipalities—Belleville, Bloomfield, Montclair, Glen Ridge, East Orange, Orange, West Orange, South Orange, and Irvington—and to the east are East Newark, Harrison, and Kearny, facing Newark from the east bank of the Passaic River. The latter group is strung together as one city and reached from Newark by several bridges, trolley and steam-railway lines. The suburban communities to the west and north surround Newark crescent-like, built so close to the big city as to give no sign where one ends or the other begins. All these municipalities are included in a Greater Newark, the population of which was more than half a million in 1915.

Newark is distinctly a manufacturing centre, is often called the Birmingham of America, is financially one of the strongest municipalities of its size, is the third most important insurance-company home centre, and ranked fourteenth in population in 1910. The census total of Newark's inhabitants in 1910 was 347,469; in 1900, 246,070; in 1890, 181,830; in 1880, 136,508; in 1860, 71,941; in 1830, 10,953; in 1810, 8008. In 1798 the total was 2500 and, in 1713, 300. In 1915 the population, as taken by the State, was 366,744; 1920, 414,216.

Among manufacturing centres Newark is eleventh in total annual value (nearly 300 varieties) of finished products, about $202,000,000, which ranks it ahead of 30 States of the Union in this respect. Fifty of its industries turn out more than $1,000,000 each in value yearly. Among some of the better known products are fine jewelry, cut glass, celluloid, shoes, patent leather, cutlery, chemicals, thread, electric machinery and appliances, hats, paints and varnish, malt liquors, and foundry products. Capital invested in manufacturing is about $154,233,000, number of industrial operatives 60,000, total annual wages paid them $45,000,000, and annual cost of raw material employed $114,000,000. The annual total of freight received and shipped by rail is 5,316,000 tons and by water 3,125,000 tons.

Newark has nine national banks, one State bank, and 10 trust companies (Jan. 1, 1915), with total resources of $127,560,568, capital $11,000,000, surplus, etc., $14,710,000, and deposits of $84,856,000. There are also five savings banks with deposits of $44,585,149. This financial machinery is emphasized by the city's being the home of two of the larger life-insurance and four well-known fire-insurance companies of the country. Newark's total of life-insurance-company assets is $448,489,000 and fire-insurance-company assets $20,519,000. Total resources of its building and loan associations amount to $37,169,000.

The terraces back of the business part of the city form the residential section, supplemented by the closely adjoining municipalities named, all being interwoven by 28 electric trolley lines carrying over 450,000 passengers daily. To these must be added the high-speed electric line which connects Newark and New York via tubes under the Hudson, in addition to commutation and other accommodation by five trunk-line steam railroads. The area of the city's numerous small parks in all is greater per square mile of territory than that of any other city in the United States and is valued at $10,000,000. It has a million-dollar free public library, two law libraries, and one historical society.

In cost and architectural impressiveness the home buildings of life and fire insurance companies, several of the banks, and the municipal and county buildings would distinguish any city. More than 66,000 pupils attend 68 public grammar and high schools, and 19,000 attend 35 or more parochial and private schools. There are 27 public-school playgrounds. Religious life is represented by 150 Protestant churches, 32 Roman Catholic, and 8 Jewish temples and synagogues. Among the first named are 33 Presbyterian churches, 26 Baptist, 22 Methodist, and 16 Episcopalian. Supplementing them all are

5 orphan asylums, 12 hospitals, and 59 charitable organizations. There are 4 dramatic, 3 vaudeville, and 59 moving-picture theatres, the last with a total seating capacity of 43,000.

The city government consists of a mayor, elected every two years, and a unicameral common council, one-half elected each year, which is the legislative branch. Administration of the municipality's affairs rests with boards and commissions. Beyond legislating as to ordinances the main function of the council is to provide funds for carrying on the city's business. The mayor alone names the tax commissioners, city counsel, excise and assessment commissioners, trustees of the public library and police justices, the board of estimate, the playground and shade-tree commissions, and the board of education.

The mayor, with the consent of the council, names the police, fire, and health commissioners and the city auditor; and the council elects the treasurer, tax receiver, city clerk, and comptroller. The board of street and water commissioners is elective. Wide interest has been shown in the question of substituting the modern form of commission government. There are more than 60,000 buildings in the city, and the total municipal revenue is in excess of $12,050,000. The annual expenditure for public schools is about $3,000,000, for fire department $760,000, and for police $1,030,000. The city water works, with 300 miles of mains, cost more than $11,000,000 and have a capacity of 50,000,000 gallons daily, delivered by gravity. The daily consumption is about 41,000,000 gallons and the storage capacity nearly 10,000,000,000 gallons. The gas and electric power and light supply is second to that of no other city. There are 300 miles of sewers, costing $6,000,000, and 240 miles of streets, of which 170 are excellently paved. The net bonded debt is $30,010,000, and the tax rate in 1914 was 2.08 on ratables, totaling $403,199,000.

The city has spent $2,000,000 for highways through the meadows to upper Newark Bay and for docks, where warehouses and railway spurs are to connect with deep-sea shipping, and an industrial and export-import ocean-rail transfer centre is to be established reaching the 300-foot channel of a depth from 20 to 25 feet, according to the tide.

Newark was settled in 1666 by Congregationalists, members of 30 families, Puritans, from Milford, Branford, and Guilford, Conn. They had purchased the land, virtually equal to the present Essex County, from the Lords Proprietors, who held it under grant from Charles II, but, when they arrived by vessel, found the Indian owners objected, and bought their rights for $750 worth of weapons, tools, clothing, lead, etc. The town was originally called Milford, but shortly after, in honor of the home of their first pastor, was renamed Newark (at first New Work), from Newark-upon-Trent. The original settlers planned a community only for those whose religious beliefs were their own, but these views did not long continue. Government of the early settlement and practically until 1836 was by town meetings. Most of the earlier settlers were well to do. The first shoe industry there was started in 1680. The first tanyard was established in 1698 and the first free school in 1792. In 1776 Washington and 3000 troops were quartered at Newark. From 1748 to 1756 the College of New Jersey (now Princeton University) was located at Newark, going thence to Princeton. Jewelry has been manufactured there since 1801, and there Seth Boyden, in 1819, was the first to make patent leather in the United States, he who, in 1828, discovered the process for making malleable iron. The hatting industry, still a Newark feature, took its rise there in 1810. In 1836 Newark was chartered as a city. Plans for the city's celebration of its two hundred and fiftieth anniversary in 1916 were drawn on a scale to attract nation-wide interest.

NEWARK. A village in Wayne Co., N. Y., 30 miles east by south of Rochester, on the Barge Canal and on the New York Central, the West Shore, and the Pennsylvania railroads (Map: New York, C 4). It has a public library and is the seat of the State Custodial Asylum for Feeble-Minded Women. The home of the Fox sisters, in which modern spiritualism (q.v.) originated, is at Hydesville, near Newark. The surrounding country is a productive agricultural region, and the chief industries of the village include fruit preserving, the growing of roses and nursery stock, and the manufacture of paper boxes, tin and enamel wares, wagons, furniture, and automobile wheels. The water works and sewage plant are owned by the municipality. Pop., 1900, 4578; 1910, 6227.

NEWARK. A city and the county seat of Licking Co., Ohio, 33 miles east of the State capital, Columbus, at the junction of the forks of the Licking River, on the Ohio Canal and on the Pittsburgh, Cincinnati, Chicago, and St. Louis, the Ohio Electric, and the Baltimore and Ohio railroads (Map: Ohio, F 5). It has also good interurban electric-railway service. Situated in a plain surrounded by hills, Newark is attractively laid out, 20 miles of its streets being paved with vitrified brick and asphalt. Noteworthy features are the Auditorium, a splendid memorial to the soldiers and sailors who died in the Civil War, the Children's Home, courthouse, Federal building, public library, hospital, and Moundbuilders Park, a summer resort. Two of the most extensive earthworks of the mound builders are here, comprising a circular embankment, one mile in circumference, and a larger series of fortifications, called the Octagon Fort. Tributary to the city are fertile agricultural districts and areas of natural gas, coal, and sandstone. The manufacturing interests are very important, the establishments including electric-car works, table glassware and bottle works, locomotive shops of the Baltimore and Ohio, a large stove foundry, golf-stick works, a rope-halter factory, a hardwood saw mill, cigar, shoe, brick, and motor-truck factories, engine and machine works, an iron foundry, agricultural-implement works, flouring mills, a carriage factory, a chemical laboratory, etc. Newark was settled in 1801 and was laid out as a town in the following year. The water works, costing $800,000, and the electric-light plant are owned by the municipality. Pop., 1890, 14,270; 1900, 18,157; 1910, 25,404; 1914 (U. S. est.), 28,271; 1920, 26,718.

NEWARK, David Leslie, first Lord (1601–82). A Scottish soldier. He rose to the rank of colonel of horse in the service of Gustavus Adolphus. In 1640 he returned to Scotland to aid the Covenanters, became major general in 1643 under Alexander Leslie, Earl of Leven, and gave important aid to Cromwell in the battle of Marston Moor. After his capture of Carlisle in 1645 he was recalled to Scotland and made lieu-

tenant general of horse, and in September he practically annihilated the forces of Montrose in the south of Scotland. In 1650, when all parties in Scotland combined to support Charles II, Leslie was placed in chief command of the army, which was defeated by Cromwell at Dunbar. In 1651 Leslie was captured by the Cromwellian forces and imprisoned in the Tower. On the Restoration in 1661 he was created first Lord Newark.

NEWARK SERIES. The name given to the Triassic system in the eastern part of North America. Along the Atlantic coast from Nova Scotia to South Carolina there are many isolated areas of thick bedded red sandstones, conglomerates, and breccias, which throughout their extent exhibit marked uniformity of characteristics. The sedimentary rocks are accompanied by dikes and sheets of basalt indicating intense volcanic activity at the time of their formation. Fossils are rare and mostly of fresh-water or land types, the commonest being land plants and footprints of animals. The micaceous and feldspathic nature of the sandstone shows that it was derived from the waste of crystalline rocks. In North Carolina and Virginia the series contains workable coal seams; it also yields a good quality of building stone—the brown sandstone of Connecticut and New Jersey—and large quantities of trap for road building and engineering work. See TRIASSIC SYSTEM.

NEW ART. The English equivalent of the French *art nouveau* and the German *moderne Kunst*, designating a movement in the arts of design which marked the close of the nineteenth and beginning of the twentieth century, the counterpart in architecture and decoration of the various secession movements in painting and sculpture. Beginning in sporadic individual efforts in Europe to break away from traditional formulæ, especially in the minor arts, it began to take on the character of a movement by 1893. The posters and *orfèvrerie* of Grasset and Chéret, the pottery, metal work, and jewelry of Delaherche, Gallé, and Chaplet, all in France, the vases and minor sculpture of Wolfers in Belgium, and the highly original if somewhat eccentric houses and furniture of a Darmstadt art colony led by Olbrich and Behrens, produced between 1893 and 1903, made a profound impression in Europe, especially in Belgium, Germany, and Austria. The underlying principle of the movement, baptized with the name of art nouveau in 1893 by Bing, the French art dealer and collector, is that of protest against tradition and formulated style, the assertion of the individual taste and imagination unhampered by rules or fashions. It is thus chiefly a negative movement, with no positive unifying element, and has not resulted in creating a definite style, though it has given rise to many striking and beautiful works, especially in the industrial and decorative arts. It has profoundly modified the style of so great a master of architectural design as Wagner of Vienna, though he was trained in the school of the academic styles. But it has also given birth to many architectural works of so eccentric and extravagant a character as to offend good taste by violating the fundamental principles of structural design, especially in Germany and Austria. Architecture is an art of construction, demanding subservience to basic laws of structural expression. In furniture these laws are less important, and in jewelry and the minor arts the individual fancy may express itself with almost perfect freedom. In these arts, besides the artists already mentioned, the names of Charpentier, Guimard, Génuys, Gaillard, and Moreau-Vautier in France, of Jean Dampt and Hoentschel in France and Belgium, Brangwyn in England, and many others stand conspicuous for excellent work. Rodin (q.v.) has powerfully influenced sculpture, and Meunier, with his powerful, half-tragic naturalism, in Belgium, and Bitter in some recent works in this country, have shown that sculpture can display strong individualism in a new spirit without forsaking fundamental principles of design. In America tradition has been less dominant than in Europe, and, with less occasion for the spirit of protest, many artists have produced highly original designs without having to organize a movement under the label of new art.

NEW ATLAN'TIS, THE. The name given by Lord Bacon, in his allegory bearing the same title, to an island supposed to lie in the southern Atlantic. See ATLANTIS.

NEW BEDFORD. A port of entry and one of the county seats of Bristol Co., Mass., situated near the mouth of the Acushnet River, which expands into a fine spacious harbor that leads into Buzzards Bay (Map: Massachusetts, F 6). Fort Rodman, on Clark's Point, with a garrison of 125 men, defends the harbor entrance. On the opposite side of the harbor is situated the town of Fairhaven, with which New Bedford is connected by three bridges, one of which cost $1,500,000 and is one of the features of the city. The city is 56 miles south of Boston and is the terminus of a division of the New York, New Haven, and Hartford Railroad. New Bedford is connected with Fall River, Taunton, and towns on Cape Cod by both steam railroads and trolley lines, and by passenger steamboat lines with Woods Hole, Marthas Vineyard, and Nantucket. The New England Navigation Company maintains excellent passenger service to New York during the summer months and freight service all the year. The harbor has been much improved by the national government, and the State Legislature of 1914 made an appropriation of $350,000 for the erection of a shipping pier upon the harbor front. The area of the city is 19.39 square miles. It is regularly laid out, with 184 miles of paved or macadamized streets. Among the prominent buildings are the municipal building, the post office, the registry of deeds, the county courthouse, the third district courthouse of Bristol, the high school, the textile school, St. Luke's Hospital, the Masonic building, the Institution for Savings, the Five Cents Savings Bank, the Merchants Bank, the Mechanics Bank, and the State Armory. The public library, completed in 1910, is one of the finest library buildings in New England, contains 150,000 volumes, and had a circulation in 1914 of 400,000. It is rich in genealogical material and has the largest collection of books on the subject of whaling in the country. It has an endowment fund of $314,000 and receives annually from the city $25,000 to $30,000. The Old Dartmouth Historical Society, an institution of the city, also contains much material of interest, especially pertaining to the whaling industry. Public parks, aggregating 219 acres, are the Common, Brooklawn, Buttonwood, Hazelwood, Grove, and Ashley.

New Bedford was for many years the principal whaling port of the world, 59 whaling vessels being registered there in 1804. Arctic whaling, begun in 1848, marked a new era, and in 1857 New Bedford had 329 registered whaling ships. The Civil War, during which many vessels were either destroyed or purchased by the government, and especially the discovery of oil fields in Pennsylvania, caused a decline, and New Bedford is now distinctively a manufacturing city, the largest producer of high-grade cotton yarns and fancy woven fabrics of cotton and silk in the United States. In 1914 capital to the amount of $47,820,575 was invested in the leading industries. The cotton mills in 1914 contained 3,010,195 spindles and 53,699 looms, and the employees numbered 31,820. There are also manufactories of silverware, cut glass, and specialties for textile lines, machine shops, foundries, oil manufactories, cordage works, paint works, lumber mills, etc. The trade of the city is considerable, the leading commodities being coal, cotton, lumber, oil, fish, and general merchandise.

Under the revised charter of 1896 the government is vested in a mayor, chosen annually; a bicameral council, the aldermen being nominated by wards, but elected on a general ticket; and administrative officers as follows: licensing board, city solicitor, chief of police, appointed by the mayor; health board, appointed by the mayor, confirmed by the aldermen; poor board, appointed by the mayor, confirmed by the council in convention; cemetery board, park board, trustees for public library, elected by the city council; school committee, consisting of the mayor ex officio and six members elected by popular vote. Most of the other city officers, as the city clerk, the city treasurer, the city auditor, etc., are elected by the city council in convention. The water works are owned and operated by the municipality. New Bedford spent in 1914, for maintenance and operation, $2,225,831.50, the principal expenditures being, for schools, $520,063.51; interest on debt, $370,059.12; police, $198,234.16; fire department, $158,860.11; highways, $289,909.43; charities and corrections, $132,477.76; health, $193,315.59; street lighting, $105,359.39. The assessed valuation in 1914 was $108,032,232.79; the bonded debt, $9,951,989.05; sinking funds, $1,777,453.51. Pop., 1790, 3313; 1880, 26,845; 1890, 40.733; 1900, 62,442; 1910, 96,652; 1915 (est.), 110,000; 1920, 121,217.

New Bedford originally formed a part of the town of Dartmouth and was set off from it in 1787. In 1812 it was incorporated as a separate township and in 1847 as a city. The town was called Bedford for Joseph Russell, one of the founders, whose family name was the same as the Duke of Bedford; it was later called New Bedford to distinguish it from Bedford in Middlesex County. The site was visited by the English navigator Bartholomew Gosnold in 1652. It was settled in 1652 by John Cook and others from Plymouth, who purchased the land from Massasoit, sachem of the Narragansets, and his son Wamsutta. The famous Wamsutta Mills, the first cotton mills built in the city, and the Wamsutta Club, the leading social club in the city, perpetuate the name of the latter chief. During the Revolution New Bedford sent out many privateers and, from its convenient location, became the storehouse of captured prizes. On Sept. 5, 1778, an English fleet of 32 vessels and an army under General Gray attacked the town, captured it, and reduced the greater part of it to ashes. Consult: Daniel Ricketson, *History of New Bedford* (New Bedford, 1858); L. B. Ellis, *History of New Bedford and its Vicinity, 1602–1892;* Z. W. Pease and G. W. Hough, *History of New Bedford: Industries, Institutions, and Attractions* (1889); *The Old Dartmouth Historical Sketches* (1903 et seq.), published by Old Dartmouth Historical Society.

NEWBERN, nū'bĕrn. A city, port of entry of the Pamlico district, and the county seat of Craven Co., N. C., 87 miles northeast of Wilmington, on the Neuse River at its confluence with the Trent and on the Atlantic Coast Line and the Norfolk Southern railroads (Map: North Carolina, E 2). It exports fish, cotton, lumber, and vegetables. It has ironworks, cottonseed-oil and lumber mills, foundries and machine shops, carriage and fertilizer factories, bottling and lime works, and extensive fish, oyster, lumbering, and truck-gardening interests. The most prominent architectural features of the city are the government building, the county courthouse, and two bridges over the Neuse and Trent rivers, both affording fine views of river scenery. The government, under a charter of 1899, is administered by a mayor, elected every two years, and a board of aldermen. The water works and electric-light plant are owned and operated by the municipality. Newbern was settled by Swiss in 1710, was for a time the capital of the Province of North Carolina, and for many years was its most important seaport. It was strongly fortified during the Civil War, but was captured by General Burnside, March 14, 1862, after a severe engagement 3 miles from the city, the Union loss being about 100 killed and 500 wounded. Pop., 1900, 9090; 1910, 9961; 1914 (U. S. est.), 10,281; 1920, 12,198.

NEW'BERRY. A city and the county seat of Newberry Co., S. C., 43 miles by rail westnorthwest of Columbia, on the Columbia, Newberry, and Laurens and the Southern railroads (Map: South Carolina, C 2). It has a fine city hall and courthouse and Newberry College (Lutheran), which was opened in 1858. The centre of a productive cotton-growing region, Newberry carries on a considerable trade and manufactures cotton goods, cottonseed oil, fertilizers, coffins, etc. The government is administered, under a charter of 1894, by a biennially elected mayor and a unicameral council. The water works and electric-light plant are owned by the city. Pop., 1890, 3020; 1900, 4607; 1910, 5028.

NEWBERRY, John Strong (1822–92). An American geologist. He was born at Windsor, Conn., Dec. 22, 1822, and died at New Haven, Dec. 7, 1892. Most of his early life was spent in the Western Reserve of Ohio. He graduated from Western Reserve University at Hudson in 1846 and from the Cleveland Medical School in 1848. After two years at Paris, spent in postgraduate work in medicine and paleontology, he established himself as a physician in Cleveland (1851). In 1855 he joined an exploring expedition under Lieutenant Williamson, sent out by the War Department to examine the country between San Francisco and the Columbia River. His geological investigations were published as a separate volume of the *Reports of Explorations and Surveys to Ascertain the Most Prac-*

tical and Economic Route for a Railroad from the Mississippi River to the Pacific Coast, Made in 1855–56 (Washington, 1857). In 1857–58 he acted as geologist to an expedition headed by Lieutenant Ives, sent out to explore the Colorado River. Newberry's paper relating to the geology, physiography, and Indian tribes undoubtedly forms the most valuable and interesting part of the *Report on the Colorado River of the West, Explored in 1857–58* (Washington, 1861). The next year Newberry again went into the field, this time as naturalist of an expedition under Captain Macombe, which explored southwestern Colorado and adjacent parts of Utah, Arizona, and New Mexico. The results appeared in 1876 as *Reports of the Exploring Expedition from Santa Fé to the Junction of the Grande and Green Rivers* (Washington, 1876). During the Civil War Newberry served as secretary to the Sanitary Commission for the Mississippi valley. Afterward he became attached to the Smithsonian Institution, at the same time holding a professorship in Columbian (now George Washington) University at Washington, to which he had been called in 1857. In 1866 he was offered the chair of geology and paleontology in the School of Mines, Columbia College, which he accepted and held for 24 years. In 1869, when the Ohio Geological Survey was established, he was made director and personally did much of the work described in several of the reports. In addition he was a member of the Illinois Geological Survey and described the extensive collections of fossil plants gathered by Hayden's survey of the West. In 1867 he was elected president of the American Association for the Advancement of Science and in the same year was chosen president of the New York Academy of Sciences, a position which he held for 24 years. He was also president of the Torrey Botanical Club from 1880 to 1890, assisted in the organization of the Geological Society of America at Cleveland in 1888, and served as a member of the commission to organize an international geological congress, of which he was president in 1891. The Murchison medal of the Geological Society of London was awarded to him in 1888. In addition to the works above mentioned Newberry also wrote: *The Rock Oils of Ohio* (1859); *Iron Resources of the United States* (1874); *The Structure and Relations of Dinichthys* (1875); *Report on the Fossil Fishes Collected on the Illinois Geological Survey* (1886); *Fossil Fishes and Fossil Plants of the Triassic Rocks of New Jersey and the Connecticut Valley* (1888); *Paleozoic Fishes of North America* (1889); *Later Extinct Floras* (1898). Consult J. J. Stevenson, "Memoir," in the *American Geologist* (Minneapolis, July, 1893), and C. A. White, *Biographical Memoir of John Strong Newberry* (Washington, 1908).

NEWBERRY, Percy Edward (1869–). An English Egyptologist, born at Ealing and educated at King's College, London. He first prepared himself to be a botanist and in this field wrote between 1888 and 1890 a *History of English Gardening.* But as early as 1884 he had become interested in Egyptology, and in 1890 he was appointed the officer in charge of the archæological survey of Egypt for the Egypt Exploration Fund. Five years later he began a survey of the necropolis at Thebes which occupied him until 1901. Newberry served on the staff of the *Catalogue Général* of the museum at Cairo in 1902–03 and in 1907 was appointed Brunner professor of Egyptology at the University of Liverpool. Among his numerous writings on the subject of his researches are: *Beni Hasan* (1891–93); *El Bersheh* (1893–94); *The Amherst Papyri* (1900); *The Life of Rekhmara* (1900); *The Tomb of Thouthmosis IV* (1904); *Scarabs* (1905); *Five Years Explorations at Thebes* (1912).

NEWBERY, John (1713–67). A famous English bookseller and publisher, the son of a poor farmer of Waltham St. Lawrence in Berkshire. He attended the village school, but he educated himself mainly by reading. In 1730 he went to Reading, where he entered the service of William Carnan, editor of the *Mercury.* After the death of his employer, in 1737, he married his widow. Somewhat later he opened in London a bookshop and publishing house in St. Paul's Churchyard (1745). He started several newspapers, and among their contributors were Goldsmith and Dr. Johnson. To Newbery's *The Public Ledger* (founded 1760) the former contributed his *Citizen of the World.* Newbery was the first publisher to issue books especially for the young. His *Juvenile Library* was made up of dainty volumes bound in flowered and gilt Dutch paper. Among them were *Goody Two Shoes* (reprinted with introduction by C. Welsh, London, 1881) and *Tommy Trip.*

NEW BOGOSLOV. See Grewingk Island.

NEWBOLD, nū'bōld, W(illiam) Romaine (1865–). An American professor of philosophy. He was born at Wilmington, Del., and was educated at the University of Pennsylvania (A.B., 1887; Ph.D., 1891), where, after teaching Latin at the Cheltenham Military Academy in 1887–89, he was instructor in Latin, lecturer in philosophy, assistant professor of philosophy, professor in 1903–07, and Adam Seybert professor after 1907. He was also dean of the graduate school of the university from 1896 to 1904. In 1895–96 he was coeditor of the psychological department of the *American Naturalist.*

NEW'BOLT, Henry John (1862–). An English writer, born at Bilston, Staffordshire, where his father was vicar. He was educated at Clifton College, Bristol, and at Corpus Christi, Oxford. Called to the bar at Lincoln's Inn (1887), he practiced law till 1899. In 1900–04 he edited the London *Monthly Review.* He is best known for his martial poems in *Admirals All* (1897) and *The Island Race* (1898, largely a reprint). Among his other publications are a novel entitled *Taken from the Enemy* (1892); *Mordred,* a tragedy; *Stories from Froissart* (1899); *Froissart in Britain,* with illustrations taken from originals in the British Museum (1900); *The Old Country,* a romance (1906); *The New June* (1909); *The Twymans* (1911); *Poems Old and New* (1912); *The Book of the Blue Sea* (1914); *Drake's Drum and Other Poems of the Sea* (1915). Consult William Archer, *Poets of the Younger Generation* (New York, 1902).

NEW BRAUNFELS, broun'fĕlz. A city and the county seat of Comal Co., Tex., 31 miles northeast of San Antonio, at the confluence of the Guadalupe and Comal rivers, and on the Missouri, Kansas, and Texas and the International and Great Northern railroads (Map: Texas, C 5). Noteworthy features include Landa's Park and fine Federal and courthouse buildings. The Comal River, though short, is of considerable volume. The city is the dis-

tributing point for an extensive farming and cattle-raising district, and is industrially important because of its good water power, some of the largest flour mills in the State being situated here. The principal manufactured products include flour, cottonseed oil, leather, lime, and bricks. The water works and electric-light plant are owned by the city. Pop., 1900, 2097; 1910, 3165.

NEWBRIDGE. See PONTYPRIDD.

NEW BRIGHTON, brī'ton. A borough in Beaver Co., Pa., 28 miles northwest of Pittsburgh, on the Beaver River and on the Pittsburgh and Lake Erie and the Pennsylvania Company railroads (Map: Pennsylvania, A 5). It has the Merrick Art Gallery, a home for the aged, a children's home, a fine Federal building, Beaver Valley General Hospital, Y. M. C. A. and public high-school libraries, and a public park. The river furnishes adequate water power, and there are deposits of coal and clay in the vicinity. New Brighton is an important industrial centre, its manufactures including pottery, bricks, sewer pipe, glass, flour, twine, lead kegs, refrigerators, bath tubs, wall paper, steel castings, nails, rivets, wire, etc. Pop., 1900, 6820; 1910, 8329; 1914 (U. S. est.), 8971.

NEW BRIT'AIN. The former name of the Bismarck Archipelago (q.v.); also applied to the largest island of the archipelago, now called New Pomerania (q.v.).

NEW BRITAIN. A city and town (coextensive) in Hartford Co., Conn., 9 miles southwest of Hartford, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, D 3). It has a State normal school and New Britain Institute, and two fine public parks, one of 90 acres developed and one of 138 acres undeveloped. New Britain is noted for its extensive manufactures, which, in 1909, represented an invested capital of $32,000,000 and had a production valued at $22,000,000. The manufacture of builders' hardware and cutlery is particularly noteworthy. Other important manufactures are hardware, foundry and machine-shop products, cutlery and edge tools, hosiery and knit goods, stamped ware, saddlery, buckles, etc. Situated in a fertile agricultural district, New Britain also has some farming and peach-growing interests. The government is administered, under a consolidation charter of 1905, by a mayor, chosen every two years, a unicameral council which controls elections of the majority of subordinate municipal officers, and commissions appointed by the mayor. The city clerk and treasurer, collector, auditor, and school board are, however, chosen by popular vote. There are municipal water works and municipally owned underground ducts. The city's income in 1914–15 was $1,332,211, while its payments amounted to $1,189,014, the chief items of expenditure being $55,394 for police department, $47,372 for fire department, and $208,172 for education. Pop., 1900, 25,998; 1910, 43,916; 1915, 52,203; 1920, 59,316. New Britain was settled in 1687 and was incorporated as a parish under the name New Britain Society in 1754. It was separated from Berlin and incorporated as a township in 1850, and in 1871 was chartered as a city. This was the birthplace and home of Elihu Burritt (q.v.). Consult Camp, *History of New Britain* (New Britain, 1889).

NEW BRUNSWICK, brŭnz'wĭk. A province of the Dominion of Canada. It lies between lat. 44° 30′ and 48° 6′ N. and long. 63° 47′ and 69° 5′ W., and is bounded on the north by Quebec and the Bay of Chaleur, on the east by the Gulf of St. Lawrence and Northumberland Strait, on the south by Nova Scotia and the Bay of Fundy, and on the west by the State of Maine and Quebec (Map: Canada, R 7). It has an area of 27,985 square miles, including 74 square miles of water area.

Topography. The coast on the Gulf of St. Lawrence is low and sandy, with numerous spits and lagoons; that on the Bay of Fundy is bold and rocky. The latter is protected from the scouring action of the extraordinarily high tides by a ridge of hard Cambrian rock, with small areas of Silurian and Devonian as well as of the older Huronian and Laurentian systems. Another ridge, composed of granite, traverses the province from the southwest to the northeast corner. It forms the main divide between the eastern and western rivers, and has an average height of 1000 to 1500 feet, with a number of detached monadnocks from 2000 to 2500 feet high. These ridges are regarded as outlying branches of the Appalachian system. They inclose between them a large, triangular tract of low, undulating plain, occupying the eastern half of the province, and underlain by the Carboniferous system. West of the dividing range is a Silurian plateau much eroded and trenched by the valley of the St. John River. The geology of the province is somewhat confused and not yet definitely understood; but it is probably in many respects similar to that of Nova Scotia (q.v.).

Nearly all the western half of New Brunswick is drained by the river St. John, which, after forming for a long distance the boundary between the Province of New Brunswick and the State of Maine, flows through the province in a southerly direction as far as the forty-sixth parallel, then turns to the east and discharges into the Bay of Fundy through an estuary extending north and south for about 50 miles. The northeastern part of the province is drained into the Gulf of St. Lawrence through a large number of small streams. There are numerous lakes. Grand Lake, in the south-central portion, is the only one of considerable size. The coast line is 500 miles in extent, and is indented by spacious bays, inlets, and harbors. The tides, which have a great range in height, the spring tides at the head of the Bay of Fundy rising 50 feet, determine in many instances the hours of movements of vessels. The chief bays are: Fundy, Chignecto, and Cumberland, the last two being merely extensions of the first; Passamaquoddy Bay in the south; Verte, Shediac, Cocaigne, Richibucto, and Miramichi bays on the east; and the Bay of Chaleur, 90 miles long by 12 to 25 broad, in the northeast.

Climate. New Brunswick is subject to extremes of heat and cold. At inland points the extremes are greatest, the temperature sometimes falling to 30° below zero F. in the winter and rising to 95° F. in the summer. The atmosphere, however, is drier than on the coast, and the extremes do not occasion great discomfort. Spring opens later and summer lingers longer than in the provinces farther west. The rainfall for the province averages above 40 inches.

Mining. Although a large part of the province is occupied by Carboniferous strata, the mineral coal is for the most part impure or in

THE MARITIME PROVINCES
NEW BRUNSWICK, NOVA SCOTIA
AND
PRINCE EDWARD ISLAND
STATUTE MILES
KILOMETERS
Longitude West from Greenwich
QUEBEC
NEW BRUNSWICK
NOVA SCOTIA
PRINCE EDWARD ISLAND
NEWFOUNDLAND
GULF OF ST. LAWRENCE
ATLANTIC OCEAN
BAY OF FUNDY
CAPE BRETON ISLAND
MAGDALEN ISLANDS (To Gaspe Co., Quebec)
RESTIGOUCHE
GLOUCESTER
NORTHUMBERLAND
VICTORIA
MADAWASKA
CARLETON
YORK
SUNBURY
QUEENS
KENT
WESTMORLAND
ALBERT
KINGS
ANNAPOLIS
DIGBY
YARMOUTH
SHELBURNE
LUNENBURG
QUEENS
HALIFAX
COLCHESTER
CUMBERLAND
PICTOU
ANTIGONISH
GUYSBOROUGH
RICHMOND
INVERNESS
VICTORIA
CAPE BRETON
SABLE I.
L.L. POATES ENGR'G CO., N.Y.

thin seams, and is but little worked. The coal-like mineral albertite, formerly mined with great profit in Albert County, has long since been exhausted. Salt springs are numerous. Nickel and iron ore are found, as are also antimony and manganese. Valuable copper deposits were reported to be discovered in 1913 at Black River, near St. John. Gypsum, plumbago, grindstone, and limestone are very abundant, and the freestone of the province, unsurpassed for beauty and durability, commands a high price in the United States. The value of the mineral production in 1913 was $1,049,320.

Fisheries. From an early period fishing has been one of the leading industries. The waters on both coasts rank among the best fishing grounds of the world. Fish breeding is assisted by the Dominion government. New Brunswick has 7 of the 51 fish hatcheries in Canada. For a decade and a half the annual earnings from fisheries have been about $4,000,000, Nova Scotia alone, among the Maritime Provinces, exceeding that amount. New Brunswick thus nearly ranks with Massachusetts, which is the leading sea-fishing State of the United States. The herring, smelt, sardine, and lobster fisheries are of greatest importance, and in the first three New Brunswick leads all the other provinces. For the fiscal year 1913 the value of the catch was $4,264,054. There were 21,675 men engaged in the industry.

Agriculture. The kind and quality of soil vary greatly with the underlying geological formation, but it is generally fertile, though much of the surface is too hilly to admit of profitable cultivation. In most of the valleys, and in the diked districts, e.g., at the head of the Bay of Fundy, the fertility is of a high grade. Originally the whole area was covered with forests, of which about one-half has been removed. The nature of the forests is not uniform, but they usually consist of both hard and soft woods. On the Bay of Fundy the species are largely confined to spruces and firs, as a consequence of the cold winds of that region. Spruce, fir, and tamarack also prevail in the western part of the province. But farther eastward the hardwood varieties, such as maple, beech, ash, and birch, prevail, interspersed with spruce and pine. The elm abounds in the river valleys, and with it are found the birch and red maple. According to the forestry branch of the Department of the Interior at Ottawa, the estimated acreage of commercial timber in 1914 was 9,000,000. In 1902 a law was passed for the establishment of a large national park and game preserve at the sources of the Tobique, Nipisiguit, and Miramichi rivers. Excellent laws protect fish and game. (See GAME LAWS.) The destruction of the forests in New Brunswick, as in the other Maritime Provinces, seems to have had a climatic effect quite different from that which usually follows, viz., the rainfall increases, resulting in the growth of the soft woods—balsam, spruce, and tamarack—in the region where the hard woods were removed.

Agriculture is the leading occupation, but it has not reached extensive proportions. The natural growth of marsh hay in the valleys supplies an abundant and valuable hay product. Hay, potatoes, oats, turnips, and buckwheat are the most valuable field crops. In 1913, 577,000 acres of hay and clover yielded 698,000 tons, valued at $7,615,000; 43,500 acres of potatoes yielded 10,629,000 bushels, valued at $4,677,000; 195,000 acres of oats, 5,946,000 bushels, value $3,032,000; 9000 acres of turnips, 3,346,000 bushels, value $1,271,000; 64,000 acres of buckwheat, 1,782,000 bushels, value $962,000. The total area under field crops in 1914 was 904,055 acres and the value of the product was $20,045,000. The climate is rather too severe for the large fruits, except in certain regions like the valley of the St. John, where the hardier varieties are successfully grown. The smaller fruits, however, are abundant, and, ripening late, are put on the New England market at monopoly prices. The situation of the province on the seaboard gives it a marked advantage in marketing produce.

Considerable attention is given to the raising of sheep, and more especially cattle, and in very recent years there has been a decided growth in the dairy industry. In 1913 there were 65,103 horses, 106,904 milch cows, 107,864 other cattle, 135,115 sheep, and 77,014 swine. In 1910 there were 42 butter factories and creameries, producing 1,166,243 pounds of cheese and 849,633 pounds of butter. Fox farming attained considerable proportions in 1913. At the close of that year there were 40 fox ranches in the province, and a large number of companies were incorporated. Silver-black foxes are imported from Alaska (see FUR FARMING). The province has government experimental farms and agricultural schools.

Manufacturing, Transportation, and Commerce. Dominion, provincial, and municipal aid has greatly facilitated the construction of railways; the mileage for all lines aggregated 1545 miles in 1913. There were in 1913 about 600 miles of railway under construction. The Canadian Pacific connects the province with the railroad systems west by running west from St. John and crossing the State of Maine. The Intercolonial enters the province from Quebec on the north and traverses the east side of the province, one branch connecting with St. John. The National Transcontinental, the eastern section of the Grand Trunk Pacific Railway, runs from Moncton westerly and northwesterly through the province and thence to Quebec and Winnipeg. The position of New Brunswick on the Atlantic coast, and the large number of excellent harbors, greatly favor its commercial advantage. The foreign trade of the province passes through the port of St. John. The winter port business of the city in 1912–13 was 407,829 tons. Regular ship lines connect this port with Atlantic coast points to the south and with European countries. The trade of the province for the fiscal year 1913 was $34,634,156 in exports and $14,445,811 in imports. Lumber is the chief article of export. The manufacture of lumber and of lumber products leads the manufacturing industries. Shipbuilding, which was formerly important, has greatly declined. The manufacture of wood pulp, on the other hand, is assuming large proportions, and the future of the industry is assured, because the supply of spruce—the wood used for this purpose—is practically inexhaustible. In 1911 the province had 1158 manufacturing establishments, with an invested capital of $36,125,012, employing 24,755 hands, with salaries and wages amounting to $8,314,212, and an output valued at $35,422,302 as compared with an output in 1905 valued at $22,133,951.

Government and Finance. The administration of the government is in the hands of a Lieutenant Governor and an executive council.

The council, of which the Premier is the chief, is responsible to the Legislative Assembly, composed of 46 members elected for four years. The Legislative Council was abolished in 1892. In striking contrast to some other Canadian provinces, there are no local municipal councils, the municipal affairs being managed by a county council. In this council each parish has two representatives, who serve without emolument (except in the County of Carleton), the term of office being one year. The various parish officers receive their appointments from the county council. The net debt of the province in 1912 was $4,693,457. The expenditures for 1913 amounted to $1,459,122 and the receipts to $1,446,962. Nearly half the receipts came from the Dominion subsidy, the timber licenses being next in importance. Of the ordinary expenditures, $273,189 were devoted to education and $383,363 to public works. Taxes are levied by the province upon telegraph, telephone, and insurance companies and banks. There is also a succession duty upon estates. Local expenditures are met by taxes collected upon real and personal property, income, and polls. Property is rated at its full value. The capital of New Brunswick is Fredericton.

Population. There is a high birth rate in the province, but also a rather large emigration. The censuses for 1891, 1901, and 1911 gave, respectively, 321,263, 331,120, and 351,889. There is a small French element. The great bulk of the population is of British origin, the Irish especially being well represented. St. John had a population of 42,511 (1911); 1915 (local est.), nearly 70,000. Moncton in 1911 had a population of 11,345, and Fredericton 7208.

Religion. The Roman Catholics number more than one-third of the total religious membership of New Brunswick, their number in 1911 being 144,889. Among the Protestants, the Baptists, according to the census of 1911, are strongest (82,106), followed by the Anglicans (42,864), Presbyterians (39,207), and Methodists (34,558).

Education and Charities. Educational affairs are in the hands of a superintendent of education and an educational council. Unlike Quebec and Ontario, the province does not provide for separate denominational schools. There is uniformity of methods, textbooks, etc., throughout the province. Attendance is compulsory. One in every 5.53 of the population is enrolled in the public schools, the proportion between the grammar and the elementary enrollment being about 1 to 60. In 1912–13 the number of public schools was 1897; teachers, 2003; pupils, 63,580, with boys and girls about equal in number; average daily attendance, 43,624; female teachers, 1810; male, 193. The province maintains normal schools and provides for higher education at the University of New Brunswick at Fredericton. The religious denominations maintain seminaries and universities, of which Mount Allison University (Methodist) at Sackville is the largest. The University of St. Joseph at Memramcook is a Roman Catholic institution. The expenditure for educational purposes shows a steady increase from $413,967 in 1888 to $955,224 in 1913.

Of the charitable institutions, the asylums for the insane constitute the greatest item of expenditure. The province supports also, in whole or part, a general hospital (at St. John), a boys' industrial home, a country home or shelter for children, and deaf and dumb institutions. Private and sectarian interests are well represented in charitable work. Convicts sentenced to penal life are sent to the Dominion penitentiary at Dorchester.

History. The first European settlement was made on the Bay of Chaleur by Frenchmen in 1639, and in 1672 further settlements were made on the Miramichi River and along the coast. With Nova Scotia, New Brunswick formed the original French colony of Acadia or New France, which was taken by the English in 1654, restored to France in 1667, but re-ceded to the English in 1713 by the Treaty of Utrecht, although disputes as to the boundaries lasted until the Treaty of Paris in 1763 finally settled the question in favor of the British. The first British settlements were made by Scottish agriculturalists and laborers along the Miramichi in 1764. In 1783 over 5000 United Empire Loyalists from the United States settled in the colony. In 1784 Nova Scotia and New Brunswick separated to form distinct colonies, and in January, 1786, the first Legislative Assembly of New Brunswick met at St. John. In 1848, after prolonged struggle, responsible government was established. In 1867 New Brunswick united with Ontario, Quebec, and Nova Scotia, and thus became one of the original provinces of the Dominion of Canada. After Confederation an agitation arose for full, undenominational public schools, which were established by law in 1871. The Roman Catholics strongly opposed this law, but were induced to accept a compromise in 1875. The course of provincial history thereafter followed local issues, and Liberal and Conservative administrations alternated according to the success or failure of the appeal for popular support upon those issues. The most noteworthy events were the Supreme Court of Judicature Act, establishing a court with three trial divisions (1906); the creation of a Public Utilities Commission, with three commissioners, for the regulation of rates and services of any public utility (1910); the destruction of the town of Campbellton by fire in the same year; and the various legislative measures for developing new railways and the natural resources of the province. Local option in regard to the liquor traffic is in force in several counties.

Bibliography. L. W. Bailey and D. R. Jack, *Woods and Minerals of New Brunswick* (Fredericton, 1876); A. R. C. Selwyn and G. M. Dawson, *Descriptive Sketch of the Physical Geography and Geology of the Dominion of Canada* (Montreal, 1884); A. B. Willmott, *The Mineral Wealth of Canada* (London, 1898); William Kingsford, *History of Canada* (London, 1887–98); M. H. Perley, *On the Early History of New Brunswick* (St. John, 1891); James Hannay, *History of New Brunswick* (St. John, 1909).

NEW BRUNSWICK. A city and the county seat of Middlesex Co., N. J., 31 miles southwest of New York, at the head of navigation on the Raritan River, about 15 miles from its mouth, and on the Pennsylvania and the Raritan River railroads (Map: New Jersey, D 3). It is the eastern terminus of the Delaware and Raritan Canal. A magnificent railway bridge spans the river at this point. The city has a large public library and also the Voorhees and the Gardner A. Sage libraries, and is the seat of Rutgers College (q.v.), of the Theological Seminary of

the Dutch Reformed church in America, and of the State Agricultural and Mechanical College with the State model farms; and there are three hospitals and 229 acres of public parks. New Brunswick is extensively engaged in manufacturing, the chief products being hosiery, wall paper, automobiles, musical strings, rubber boots and shoes, bicycle and automobile tires, surgical and medical supplies, chemicals, fruit jars, boilers, cigars, foundry products, knitting needles, linoleum, washing bluing, sash and blinds, shoes, etc. The city is governed by the commission form of government. A commission of five men elected by the people for a term of four years, gives a direct administrative head to five departments, which cover all branches of the city government, excepting the board of education, which board is appointed by the mayor and is held absolutely responsible for the educational affairs of the city. The water works are owned and operated by the municipality. Pop., 1900, 20,006; 1910, 23,388; 1914, 24,827; 1920, 32,779. The first settlement here was made in 1681. The place was first called Prigmore's Swamp (1681–97), then Inian's Ferry (1691–1714), and finally New Brunswick, in honor of the house of Brunswick. New Brunswick was incorporated as a town in 1736 and was chartered as a city in 1784. It suffered much during the Revolution, and during the winter of 1776–77 was occupied by the British.

NEW BRUNSWICK THEOLOGICAL SEMINARY. See THEOLOGICAL SEMINARY OF THE REFORMED CHURCH IN AMERICA.

NEW'BURGH. A city in Orange Co., N. Y., 60 miles north of New York City, on the Hudson River, about 5 miles above the picturesque Highlands, on the Erie and the West Shore railroads, and on the lines of several steamship companies (Map: New York, A 1). It is built on a steep, terraced slope, rising about 300 feet above the river to an extended plateau. The city has a public library, two public parks, St. Luke's Home and Hospital, Home for the Friendless, Home for Children, and a county tuberculosis sanatorium. Among noteworthy buildings are a beautiful Masonic Temple, Y. M. C. A. building, and the Broadway School. The river here expands into Newburgh Bay, giving the city a deep water front and facilities for traffic by water. There is a trade in agricultural and dairy products, and large quantities of coal from Pennsylvania are here transferred to barges and coasting vessels. Newburgh is of considerable importance as an industrial centre, having manufactories of cottons, woolens, silks, paper, felt hats, baking powder, soap, paper boxes, brick, plush goods, steam boilers, tools, waterway gates, ice machines, pumps, moving-picture screens, overalls, perfumes, furniture, carpets, carburetors, spiral springs, spiral pipe, shirt waists, shirts, felt goods, lawn mowers; shipyards; foundries and machine shops; tanneries; leatherette works; plaster works. It is also a popular resort, being visited by thousands of New Yorkers during the summer months. Of particular interest is Orange Lake with its recreation park. The city has adopted Plan C of the Optional Charter Law of New York State. This provides for a mayor and four councilmen elected for four years. The executive power is vested in a city manager, who is appointed by the council. The water works are owned and operated by the municipality. Pop., 1890, 23,087; 1900, 24,943; 1910, 27,805; 1914, 29,023; 1920, 30,366. The first settlement at Newburgh was made in 1709 by German Lutherans from the Rhenish Palatinate, who named it the Palatine Parish by Quassaic. By 1750 most of the Germans had been replaced by people of English and Scottish descent, who in 1752 changed the name to the Parish of Newburgh (after Newburgh, Scotland). Newburgh was the headquarters of the American army from March, 1782, until the latter part of 1783, and it was here that the Newburgh Letters were circulated, that the army was disbanded, and that Washington received the famous Nicola letter proposing that he become King. The Hasbrouck house, then occupied by Washington, is now owned by the State and used as a museum for Revolutionary relics. On the grounds is the Tower of Victory, an imposing stone structure erected by the United States and State governments to commemorate the close of the war. Newburgh was incorporated as a village in 1800 and was chartered as a city in 1865. Consult: E. M. Ruttenber, *History of Orange County with History of the City of Newburgh* (Newburgh, 1876); J. J. Nutt, *Newburgh: Her Institutions, Industries, and Leading Citizens* (ib., 1891); L. P. Powell (ed.), *Historic Towns of the Middle States* (New York, 1899).

NEWBURGH, WILLIAM OF. See WILLIAM OF NEWBURGH.

NEWBURGH ADDRESSES. Two anonymous letters that appeared in 1783, after the close of the Revolutionary War. They urged some organized action to redress the wrongs of American soldiers, especially the withholding of their pay, and were later found to have been written by Gen. John Armstrong.

NEW'BURN. A town in Northumberland, England, on the Tyne, 5½ miles west of Newcastle. Pop., 1901, 12,500; 1911, 17,155.

NEW'BURY. A municipal borough and market town in Berkshire, England, on the Kennet and on the Kennet and Avon canal, 17 miles west-southwest of Reading (Map: England, E 5). It has fine municipal buildings. Trade in agricultural produce and malting are the principal industries, and an annual wool market is held. The chief buildings are the church, built in the reign of Henry VII, and the Corn Exchange. The town owns real estate, markets, and the gas works. It dates from the Roman period, and was a gift of the Conqueror to Ernulf de Hesdin. Newbury is best known for two hard-fought battles between the Royalists and Parliamentarian forces in September, 1643, and in October, 1644. On the battle field is a handsome memorial to Lords Falkland, Sutherland, and Carnarvon, Royalists, who fell there. Pop., 1901, 11,061; 1911, 12,107. Consult W. Money, *History of Newbury* (Oxford, 1887).

NEW'BURYPORT. A city, including several villages, a port of entry, and one of the county seats of Essex Co., Mass., 38 miles by rail northeast of Boston, on the Merrimac River and on the Boston and Maine Railroad (Map: Massachusetts, F 1). Among the city's noteworthy buildings and objects of interest are the public library of 40,000 volumes, Marine Museum, Putnam Free School, Anna Jaques Hospital, Old Ladies' Home, the Old South Church, containing the remains of George Whitefield, the house in which William Lloyd Garrison was born, the Dexter House, a statue of Washington, Washington Park, and a suspension bridge. The

harbor, opening into the Atlantic Ocean, is safe and spacious. The principal manufactured products include boots and shoes, cotton cloths, silverware, machinery, and combs. Shipbuilding was formerly a very extensive and important industry. Newburyport is also a distributing centre for coal. Under the original charter of incorporation of 1851, the government is administered by a mayor, annually elected, and a bicameral council, of which the Upper House is elected on a general ticket and the Lower by wards. The municipality owns and operates the water works. Pop., 1900, 14,478; 1910, 14,949; 1914 (U. S. est.), 15,147; 1920, 15,618.

Newburyport, settled about 1635, was a part of Newbury until 1764, when it was separately established and incorporated as a town, and was chartered as a city in 1851. It was the home of Theophilus Parsons and the birthplace of Francis C. Lowell, who introduced cotton manufacturing on a large scale into the United States. Consult: Smith, *History of Newburyport, Mass.* (Boston, 1854); D. H. Hurd, *History of Essex County, Mass.* (Philadelphia, 1888); J. J. Currier, *History of Newburyport* (Newburyport, 1906).

NEW CALEDONIA, kăl'ê-dō'nĭ-a. An island in the Pacific, belonging to France, the southernmost of the Melanesian Islands. It is situated 1200 miles southeast of New Guinea, 850 miles from the coast of Queensland, and about the same distance from New Zealand (Map: Australasia, J 5). It is elongated in shape, extending from northwest to southeast, with a length of 240 miles, an average width of 30 miles, and an area of 7650 square miles. It is almost entirely surrounded by a coral reef, which is 5 to 15 miles from the shores and affords a belt of well-protected navigable water inside. The coast itself is indented with numerous bays, forming, especially on the southwestern side, many excellent harbors. The interior is essentially mountainous, although of no great height. There are two parallel ranges running the entire length of the island and inclosing the valley of the Diahat, the only river of importance. They are of nearly uniform height, except in the south, where they are broken by marshy lowlands. The highest point is an unnamed peak near the northwest coast, with an altitude of about 5387 feet. Mount Humboldt in the southeast is 5360 feet high. The northeast consists of Archæan rocks; along the west coast is a narrow band of Triassic and Cretaceous strata; while eruptive rocks, principally serpentine, cover two-thirds of the island. There are no active volcanoes, but some evidences of ancient volcanic activity, including thermal springs.

The proverbially healthful climate is both drier and cooler than that of the other Melanesian Islands. A rainy season obtains from December to May and a comparatively dry and cool season the rest of the year, although no month is rainless. The rainfall (70 inches) is sufficient to sustain a very rich flora, although large areas are semiarid pine barrens in which the *Araucaria cookii* is prominent. True forests appear chiefly in the northern part and contain much valuable timber, though sandalwood has now practically disappeared. The fauna, like that of all other Oceanic islands, is very poor in varieties, a single species of bat being probably the only indigenous mammal, while reptiles are also few. The avifauna is the richest and is related to that of the Australian continent rather than to that of New Zealand. The natives of New Caledonia, whom the French style Canaques (Kanakas), are Melanesians, probably of mixed (Papuan-Polynesian) type. The coast tribes seem to be better shaped and more regularly featured than the rest. They are above the average in stature, with dolichocephalic head form. The absence of large animals on the island has made them practically vegetarians, but it may account in part for the cannibalism which once prevailed in this part of the world. One of their most interesting institutions is the pilu-pilu, or yam-harvest dance, with its mock fight. Something like the Duk-duk Society of New Britain exists among them. Among other things worthy of note are their beehive huts, grotesque carvings of heads, and slingstones. The bow seems to be little employed, the spear and club being preferred. In many of the mountain valleys are found remains of terraced plantations which have been mistaken for aqueducts; their purpose was not so much to lead water upon the soil as to prevent the heavy flow of the rains from washing the soil away; many old terraces remain in use, and new are built as need arises. Numerous petroglyphs and rock carvings exist, some of which are considered pre-Kanaka. Since New Caledonia has been made a French penal colony, some admixture between the Europeans and the native women has taken place. Some of the tribes of the interior are still little known. The Webias of central New Caledonia, who still live in a state of independence and have not yet been seriously influenced by the whites, are said to be good-natured people and skillful fishermen. As in many of the Pacific islands, the natives are diminishing in number.

The natives are the best agriculturists of all the Oceanic tribes. They have succeeded even better than the white farmers, as the latter have been embarrassed for lack of labor, though they have imported Chinese and New Hebrides islanders. The natives live on reservations from which whites are excluded, but they are rapidly decreasing in number—50 per cent in the last 50 years. The chief agricultural products are coffee, maize, tobacco, sugar, copra, cassava, grapes, and pineapples. Wheat and cotton have also been introduced. The mineral wealth is considerable, including gold, silver, lead, copper, nickel, cobalt, chromate of iron, and coal, and these are worked mainly by Japanese miners. The last six are mined, and the nickel output is the most valuable, amounting in 1911 to 120,059,297 metric tons. The commerce is considerable. The exports in 1913 were valued at $3,082,000 and the imports at $3,447,000, the mineral exports amounting to $989,311. Of the exports, the principal are minerals, canned meats, and coffee. A railroad is under construction from Nouméa, the capital, to Bourail (90 miles). Nouméa is a municipality and the chief port of the island. It is in regular steamship communication with Sydney, New South Wales, having a good harbor, pier, and repairing slip. There are primary schools and a secondary school, a perfumery and a meat-canning factory.

The island with its dependencies, the isles of Pines, Wallis, Futuna, and Alafi, and the Huon and Loyalty Islands, is administered by a governor, who is assisted by a privy council of eight members, and there is an elective legisla-

tive body. Until 1896 the colony was chiefly used as a penal settlement, and convicts constituted the majority of the white inhabitants. Since that date no convicts have been sent, and the convict population is rapidly decreasing. In 1912 the population was 50,608, of whom 13,138 were free, 5671 were originally convicts, and 28,075 were aborigines. Immigration from France is slight, the majority of new settlers coming from Java, Tonkin, India, and other Pacific islands.

The island was discovered by Cook in 1774. In 1843 the French flag was raised, but the act was disavowed, owing to protests from England. Ten years later, however, the French took formal possession in order to put a stop to the cannibalism and excesses committed by the natives. In 1864 the penal settlement was founded, and after the Franco-Prussian War thousands of Communists were deported hither. The natives have always been suspicious of the whites and in 1878 and 1881 rose in revolt, massacring many of the colonists.

Consult: J. W. Anderson, *Fiji and New Caledonia* (London, 1880); Alfred Schreiner, *La Nouvelle-Calédonie depuis sa découverte jusqu'à nos jours* (Paris, 1882); Leôn Vallée, *Essai d'une bibliographie de la Nouvelle-Calédonie et dépendances* (ib., 1885); G. Griffith, *In an Unknown Prison Land: An Account of Convicts and Colonists in New Caledonia* (London, 1901); J. B. Alberti, *La colonisation à la Nouvelle-Calédonie* (Paris, 1909).

NEW CA'NAAN. A town, including a village of the same name, in Fairfield Co., Conn., 8 miles by rail northeast of Stamford, on Five Mile River and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, A 5). It contains the Brooks Sanitarium, the B. P. Mead Memorial Park, and attractive town hall, school, and library buildings. There is also a shirt and overall factory. New Canaan is known chiefly as a summer resort, having splendid scenery and a number of facilities for sport. Pop., 1900, 2968; 1910, 3667.

NEW CASTILE, kăs-tēl'. The southern part of Castile (q.v.).

NEW'CASTLE, nū'kăs''l. A city of New South Wales, situated at the mouth of the Hunter River, 102 miles north-northeast of Sydney, with which it is connected by rail and by steamers (Map: New South Wales, F 3). It is a well-built town with paved streets and fine public buildings. It is the see of an Anglican bishop, whose cathedral of Christ Church is a notable building, as are also the library and art school, the school of mines, and the Victoria Theatre. It is the principal port for the northern part of New South Wales and is the greatest coaling port in the Southern Hemisphere. Large quantities of wood are also shipped from this port. In 1912 the total amount of tonnage entered and cleared at Newcastle was 3,966,255. Vessels of 4000 tons can be berthed, the greater portion of the wharfage, with that at Carrington, some 5 miles in extent, belonging to the government, which has provided ample shipping appliances, in the shape of four steam cranes—two of 25 tons, six of 15 tons, and four of 9 tons—as well as a number of chutes. There are three patent slips, one of which is capable of taking up vessels of 1000 tons, and a floating dock that can lift 2000 tons. The area of the harbor, which is defended by two forts and has two breakwaters, is 540 acres. The width of the channel at the entrance of the harbor is 1200 feet, and the depth of water on the bar 25½ feet and of the harbor 27 feet at high and 23 feet at low water. The industries of Newcastle include a steam biscuit factory, copper-smelting works, a brewery, shipbuilding yards, foundries, carriage factories, and boot factories. There is also a large trade in frozen mutton. Newcastle is the seat of a United States consul and owns its gas and electric-lighting plants. The water supply is controlled by the Hunter River Water Supply and Sewerage Board, which took over the control and management of the water supply from the government on July 1, 1892. Pop., 1901, 14,250; 1911, 14,405; with suburbs, 1913, 57,650.

NEWCASTLE. A town, port of entry, and the county seat of Northumberland County, New Brunswick, Canada, situated on the left bank of the Miramichi River, at the head of deep-water navigation, and on the Intercolonial Railway, 77 miles northeast of Moncton by rail (Map: New Brunswick, D 1). It contains the county buildings, customhouse, an academy, and a Roman Catholic convent, is a lumbering centre, with several large saw mills, and manufactures sashes and doors, chairs, and wagons. The surrounding district is widely known for moose hunting and salmon fishing. Pop., 1901, 2507; 1911, 2945; 1915 (local est.), 3100.

NEW CASTLE. A city in New Castle Co., Del., 6 miles by rail south of Wilmington, situated on the Delaware River, at the head of Delaware Bay, and on the Philadelphia, Baltimore, and Washington Railroad (Map: Delaware, H 1). New Castle has a good harbor and regular steamship connection with Philadelphia and Baltimore; is the centre of an agricultural and fruit-growing region; has large shad-fishing interests; and manufactures steel castings and cotton gloves. The city possesses several buildings of historic interest, a public library, and two parks. Settled by Swedes in 1640, New Castle was held successively by the Swedes, Dutch, and English, and was the landing place of William Penn in 1682. It was incorporated first in 1875. Pop., 1900, 3380; 1910, 3351.

NEW CASTLE. A city and the county seat of Henry Co., Ind., 44 miles by rail east-northeast of Indianapolis, on the Blue River, and on the Cleveland, Cincinnati, Chicago, and St. Louis, the Fort Wayne, Cincinnati, and Louisville, and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads (Map: Indiana, G 5). The city is surrounded by a farming district and is an industrial centre of importance. The leading manufactures include sheet iron and steel, automobiles, caskets, clothing, scales, bridges, pianos, furniture, handles, shovels, lathes, bricks, flour, etc. The Indiana Village for Epileptics, comprising 1245 acres, is 2 miles north of the city. New Castle owns its water works and electric-lighting plant. Pop., 1900, 3406; 1910, 9446; 1914 (U. S. est.), 12,017; 1920, 14,458.

NEWCASTLE. A city and the county seat of Lawrence Co., Pa., 50 miles by rail northwest of Pittsburgh, at the junction of the Shenango and Neshannock rivers, and on the Erie, the Pennsylvania Company, the Pittsburgh and Lake Erie, the Baltimore and Ohio, and the Buffalo, Rochester, and Pittsburgh railroads (Map: Pennsylvania A 4). It is the commercial centre of a fertile agricultural region, which has also rich deposits of bituminous coal, lime

stone and sandstone, fire clay, and iron ore. As a manufacturing city it ranks sixth in the State, its industrial importance being dependent upon the metal-working establishments, chief among which are the steel and rolling mills, blast furnaces, tin-plate and terneplate mills, and the car-construction shops. Other plants include large cement works and manufactories of pottery, wire novelties, tin cans, boxes, drugs and chemicals, hosiery, paints, boilers, machinery, lumber products, rubber tires, radiators, etc. The city maintains an old ladies' home, two hospitals, a public library, fine courthouse and high-school buildings, and Cascade Park, a beautiful place of resort, owned by the traction company. Settled in 1812, Newcastle was chartered as a city in 1869, and adopted the commission form of government in 1914. Pop., 1900, 28,339; 1910, 36,280; 1914 (U. S. est.), 39,569; 1920, 44,938.

NEWCASTLE, Henry Pelham Fiennes Pelham Clinton, fifth Duke of (1811–64). An English statesman. He was educated at Eton and at Christ Church, Oxford, and represented South Nottinghamshire in Parliament from 1832 to 1846, when he was ousted by the influence of his father, the fourth Duke, for supporting Sir Robert Peel in his free-trade measures. In the brief Conservative administration of 1834–35 he had been a Lord of the Treasury, and First Commissioner of Woods and Forests in the Peel administration, from 1841 to 1846. He was then made Chief Secretary to the Lord Lieutenant of Ireland, but went out of office with his chief a few months afterward. He succeeded to the dukedom in 1851 and returned to office in 1852, filling the post of Secretary of State for the Colonies (which formerly included the Department of War) in the Aberdeen government. The war with Russia broke out, and in June, 1854, it was found necessary to create a Secretary of State for War, and the new office was assigned to Newcastle. He resigned as a result of an investigation into the suffering of the army at Sebastopol. Newcastle was reappointed Secretary of State for the Colonies in the second administration of Lord Palmerston, 1859, and served until 1864. In 1860 he accompanied the Prince of Wales during a tour in Canada and a portion of the United States, and on his return received the Order of the Garter from the Queen. Consult John Martineau, *The Life of Henry Pelham, Fifth Duke of Newcastle* (London, 1908).

NEWCASTLE, Margaret, Duchess of. See Cavendish, Margaret.

NEWCASTLE, Thomas Pelham-Holles, first Duke of (1693–1768). An English officeholder. He was educated at Westminster School and for a short time attended the University of Cambridge. He was one of the largest landholders in the realm, was created Duke of Newcastle-on-Tyne in 1715, in 1724 he became Secretary of State for the southern department in Walpole's coalition administration and, in spite of his amazing incompetency, was continued in this office until 1754, when he became Prime Minister. He was in power at the beginning of the hostilities of the Seven Years' War (q.v.), but affairs were mismanaged completely, and in November, 1756, Newcastle resigned. Pitt now took charge of the war and foreign affairs. In 1757 a Newcastle-Pitt ministry was formed, Pitt being the virtual head. In 1762 Newcastle was forced out of office by Lord Bute and thereafter was of little importance, though during the short Rockingham administration, formed in 1765, he filled the office of Privy Seal. He died Nov. 17, 1768. Consult: William Coxe, *Memoir of the Administration of . . . Henry Pelham* (London, 1829); P. H. S. Stanhope, *History of England from the Treaty of Utrecht to the Treaty of Versailles, 1713–83* (ib., 1851–54); W. E. H. Lecky, *History of England in the Eighteenth Century* (ib., 1878–90).

NEWCASTLE, William Cavendish, Duke of. An English statesman. See Cavendish, William, Duke of Newcastle.

NEWCASTLE-UNDER-LYME, -līm. A parliamentary and municipal borough in Staffordshire, England, 15 miles north-northwest of Stafford (Map: England, D 3). Its chief buildings are the town hall and high school, with which is incorporated the free grammar school, founded in 1602. The quaint red-sandstone tower of the restored parish church of St. Giles dates from the twelfth century. It has an art school and a library. The town has greatly improved in modern times; it owns remunerative real estate, gas, markets, and maintains a sewage farm, cemetery, and isolation hospital. Hats were formerly the principal branch of manufacture, but the making of army clothing is now the chief industry. Newcastle-under-Lyme is surrounded by famous potteries; coal mines and ironworks are also in the vicinity. There are also manufactures of cotton, leather, paper, and malt. Of Saxon origin, the town was named after a castle built by Henry I under the great forest of Lyme. The town received its first charter from Henry II in 1175. Pop., 1901, 19,914; 1911, 20,201.

NEWCASTLE-UPON-TYNE, -tīn. A city and a county borough of England, county town of Northumberland, on the left bank of the Tyne, 8 miles from its mouth and 272 miles by rail north by west of London (Map: England, E 1). The town stands partly upon an elevated plateau and partly upon the north bank of the river. The river is crossed by four bridges, which connect Newcastle with Gateshead (q.v.)—the old high-level bridge (1849), the Redheugh suspension bridge (1871), an hydraulic swing bridge (1876), and the new high-level (railway) bridge (1906). The old high-level bridge is one of the engineering triumphs of Robert Stephenson. The length of the viaduct is 1337 feet, and the height of the railway above high water 112 feet. The bridge has a broad carriageway, by which the ordinary traffic avoids the precipitous streets on both sides of the river, with passenger paths on each side, and the railway above.

Some of the modern streets are handsome and spacious, especially Grey Street, which presents a scheme of Grecian architecture, and Grainger Street. The church of St. Nicholas, forming the cathedral of the diocese of Newcastle, is a noble edifice, chiefly in the Decorated style, though its leading feature is the Perpendicular lantern tower. Other old churches are St. Andrew's (damaged by the Parliamentarians in 1644) and St. John's. Among modern churches are St. George and the Roman Catholic cathedral. In the Guildhall, an old and somewhat inconvenient building, situated beside the river, the town assizes are opened and the quarter sessions held. Under the Guildhall proper there is an exchange for the merchants, ship-

owners, and brokers of the quayside. In the Moot Hall, a modern, handsome Grecian building overlooking the swing bridge, the town and county assizes are held. The spacious town hall, a modern building, stands on a block of ground facing St. Nicholas' Church; associated with it are a corn market and offices for the transaction of the town business. The market for the sale of meat and vegetables is one of the most spacious and commodious in the Kingdom. All the railways entering the town terminate in a large station near its centre. The jail, a heavy and costly building, occupies a low and confined situation. The postal and telegraph office is one of the largest and finest of the public buildings in the town. There are two theatres—the Royal (the ornament of Grey Street) and the Tyne Theatre in Westgate Street. Among the educational institutions are a public library, a literary and philosophical society, a society of antiquaries, a natural-history society (with museum), a mechanics' institute, and an institute of mining engineers. The colleges of medicine and science are both affiliated with Durham University. A column surmounted by a statue of Earl Grey, to commemorate the passing of the Reform Bill, and a bronze statue to George Stephenson are the principal monuments in the city.

Of benevolent institutions there are several hospitals, an eye infirmary, a dispensary, asylums for the blind, the deaf and dumb, two orphanages, etc. The municipal property consists of real estate, markets, street railways, and quays. The municipality maintains baths, washhouses, free libraries, cemeteries, and dust destructors, and indirectly contributes to technical education; important domestic utilities, such as gas, water, etc., are provisionally monopolized by companies. Extensive improvements have modernized the older portions of the town, and the streets generally are well paved and well lighted. The trade of Newcastle consists largely in coal from the Northumberland and Durham regions, of which it is the great centre. Large quantities of lead, the produce of the mines of Alston Moor and Weardale, are brought to Newcastle for manufacture, and a large quantity of unrefined lead is also imported from Spain.

At Newcastle the railway system had its origin, and its locomotive and engineering works are among the largest in England. The ordnance works of Lord Armstrong situated at Elswick, the western part of Newcastle, are well known. Here steel shipbuilding and various branches of engineering are extensively carried on, and since 1882 many warships have been constructed on the Tyne. Newcastle occupies an important position in the manufacture of soda, bleaching powder, vitriol, salt, and other chemical products. Earthenware is largely manufactured, and glass staining has reached great perfection. The fire-brick trade has attained large proportions, and there are important manufactures of gas retorts and fire-clay pipes, which are sent all over the world. Immense numbers of grindstones are exported. Portland and other cements are manufactured in vast quantities.

The river Tyne from the sea to Newcastle forms a natural dock for the accommodation of shipping, and for 10 miles both banks are lined with quays and factories. It has four natural docks, the largest nearly a mile long and including two piers at its mouth. Large sums have been spent on the improvement of the Tyne. The entrance and many parts of the river have been deepened by dredging. The net tonnage of vessels entered and of vessels cleared at Newcastle, together with North and South Shields, was 3,897,142 and 4,894,157 in 1900, 5,022,250 and 6,128,928 in 1910, and 6,421,195 and 7,632,672 in 1912. At Newcastle and North and South Shields imports and exports in 1900 were valued at £10,108,716 and £11,994,740 respectively; in 1910, £9,442,944 and £11,308,177; in 1912, £10,043,427 and £10,718,200 (£10,694,596 United Kingdom produce, £23,604 foreign and colonial produce). Exports consist chiefly of coal, iron, copper, lead, alkali, and machinery; imports comprise fruits, grain, butter, sugar, metals, petroleum, etc. Newcastle is the seat of a United States consul.

Newcastle dates from the Roman Pons Ælii—one of the chain of forts by which the wall of Hadrian was fortified. On the withdrawal of the Romans the deserted camp became the residence of a colony of monks, and the town was called Monkchester. Robert, eldest son of William the Conqueror, began to build a castle here in 1079 or 1080. Hence the modern name of Newcastle. William Rufus finished his brother's castle, surrounded the town with a wall, and gave the inhabitants special privileges. The present castle, which displays better than any other in England the genius of Norman military architecture, was erected by Henry II between the years 1172 and 1177. Newcastle, being made the rendezvous of the vast armaments which the first three Edwards led into Scotland, was in their time surrounded with new walls of unusual strength and magnitude; portions of them yet remain. During the Civil War it declared for the King and sustained a 10 months' siege by the Scots. The coal trade dates from the reign of Henry III. In 1615, 400 colliers cleared the port, one-half to supply London. Lords Stowel, Eldon, and Collingwood, Mark Akenside, and Hutton, the mathematician, were natives of Newcastle. Intimately connected with it, though not born in it, were Thomas Bewick, the engraver; Robert Morrison, the Chinese scholar; and George and Robert Stephenson. Pop., 1801, 28,400; 1851, 87,800; 1901, 247,023; 1911, 266,671. Consult D. B. Rendel, *Newcastle-on-Tyne: Its Municipal Origin and Growth* (London, 1898).

NEW CHURCH. See SWEDENBORGIANS.

NEWCHWANG, or **NIUCHWANG**, nu'-chwäng' (the cattle mart). One of the treaty ports of Manchuria, China, situated in the Province of Shingking, 10 miles from the mouth of the Liao River, which falls into the Gulf of Pechili, and on the southern branch of the Chinese Eastern Railway, which is now controlled by Japan, and which formerly was associated with the Russian Trans-Siberian system (Map: China, M 3). In commercial importance the port is a rival to Dairen (Dalny), but has not been so much favored by the Japanese as the latter. For a long time Newchwang was the port of entry for south Manchuria, and was without competition until the development of Dairen first by the Russians and later by the Japanese. The vicinity of Newchwang is not very productive agriculturally, but important coal mines have been opened along the railway line, and the city acquires additional importance from its railway connection with

Tientsin and Peking. The chief exports are beans, bean cake, and oil, which go largely to Japan, and also skins, mats, and cured fish. Imports consist mainly of cotton goods, petroleum, sugar, flour, coal, and matches. In 1913 foreign imports amounted to 16,050,514 hk. tls., native imports to 9,733,593 hk. tls., and net exports to 24,480,087 hk. tls.

Formerly Newchwang was situated at the mouth of the Liao River, but has retreated inland through the silting of the coast. Thus, what is commercially known as Newchwang is in reality the port of Yingkow, or Yingtse (also known as Port Newchwang), at the mouth of the Liao, population 61,000. This port of Newchwang, which has consular representatives, was taken by the Japanese in 1895, and was originally a part of the territorial concessions of China, but Japan was forced to relinquish it. During the Boxer uprising in 1900 Newchwang was occupied by Russia, from whom it was taken by the Japanese in 1904 during the Russo-Japanese War (q.v.). At present (1915) the Japanese have virtual control through their domination of the southern part of the Manchurian territory.

NEW COLLEGE. A college at Oxford, England, originally known as the College of St. Mary of Winchester. It was founded by William of Wykeham, Bishop of Winchester, and sometime Lord Chancellor of England, in 1379 for a warden, 70 fellows and scholars, 10 chaplains, 3 clerks, and 16 choristers. The college was but a part of Wykeham's plan, which included also the establishment of the famous school at Winchester, the first of the English public schools, from whose numbers the scholars of New College were to be chosen. To this new feature in English education was added also the beginning of a tutorial system in the college, by which the ordinary university instruction was supplemented by the work of the fellows of the college with the younger scholars. In the buildings of his college Wykeham founded the school of English college architecture, and the buildings remain to-day the finest of the early colleges. In every way this foundation was the most splendid of its time, but, owing chiefly to certain curious exemptions from university supervision in examinations (cf. King's College, Cambridge), it did not play the part that might have been expected of it during most of its history. Here Vitelli taught Grocyn Greek, and thus gave the college a very real connection with the new awakening. It is to-day, in scholarship and athletics, one of the leading colleges in Oxford. The establishment, as fixed by statutes of 1855 and 1881–82, consisted in 1912–13 of a warden, 32 fellows, 3 honorary fellows, 2 chaplains, 40 scholars, college officers, and a choir, with a total of some 300 undergraduates. The connection with Winchester School is still closely maintained. The buildings are of great beauty, particularly the hall and the chapel, with windows designed by Sir Joshua Reynolds, and an imposing tower. The gardens, which include in their limits part of the old city wall of Oxford, are among the most attractive in Oxford. The college presents to 40 livings. Among the worthies of New College have been Archbishop Chichele, founder of All Souls' College, Bishop Waynflete, founder of Magdalen College, Bishops Ken and Lowth, and Sydney Smith. See KING'S COLLEGE, Cambridge; OXFORD UNIVERSITY; WILLIAM OF WYKEHAM; WINCHESTER. Consult Rashdall and Rait, *New College* (London, 1911).

NEWCOMB, nū'kom, SIMON (1835–1909). An American astronomer and mathematician, born at Wallace, Nova Scotia, March 12, 1835. He was educated first in his father's school and came to the United States in 1853. A year afterward he began teaching in Maryland and in 1857 was appointed computer on the *Nautical Almanac* at Cambridge. Graduating at the Lawrence Scientific School, Harvard, in 1858, he spent three years there in further study and was then appointed professor of mathematics in the United States navy. He negotiated the contract for, and supervised the construction of, the 26-inch equatorial telescope at the Naval Observatory. He was secretary of the Transit of Venus Commission in 1871–74, observed the transit of Venus at the Cape of Good Hope in 1882, and directed several eclipse expeditions, beginning in 1860. In 1877 Newcomb became senior professor in the navy and director of the *Nautical Almanac*, a position which he held till he was retired for age in 1897. He was also professor of mathematics in Johns Hopkins University in 1884–94 and for many years editor of the *American Journal of Mathematics*. Newcomb's labors in investigation were prodigious. He developed formulæ for the construction of accurate lunar tables and made measurements relating to the major planets, the larger asteroids, and the planetary satellites. His conclusions were notable for accuracy and often for boldness, and his memoirs for the vigor and clarity of their style. Abroad, besides holding membership in many scientific societies, he was made an associate of the Institute of France, the first native American since Franklin to be so honored, Commander of the Legion of Honor, and Knight of the Prussian Order "Pour le Mérite." Some idea of the diversity of his interests may be gained from the fact that Newcomb served as president of the American Association for the Advancement of Science (1877), the Society for Psychical Research (1885–86), the American Mathematical Society (1897–98), and the Astronomical and Astrophysical Society of America (1899, 1905); as vice president of the National Academy of Sciences (1883–89); and as president of the Congress of Arts and Sciences at the St. Louis Exposition in 1904. He received the gold medal of the Royal Astronomical Society (1874), the Copley medal of the Royal Society (1890), and the first Bruce medal of the Astronomical Society of the Pacific; also numerous other distinctions at home and abroad, including degrees from 17 universities. Newcomb died at Washington, July 11, 1909, and received a military funeral, having been made rear admiral in 1906.

Among the more important of his 300-odd scientific memoirs, published mainly in the *Astronomical Papers of the American Ephemeris*, may be mentioned: "The Recurrence of Lunar Eclipses"; "A Transformation of Hansen's Lunar Theory"; "Development of the Perturbative Function and its Derivatives"; "On the Motion of Hyperion: A New Case in Celestial Mechanics." He also published: *Popular Astronomy* (1878), since translated into many foreign languages; *Astronomy for Schools and Colleges* (1880); with E. S. Holden, *Compendium of Spherical Astronomy* (1906); and numerous works of a similar character, on mathematics or astronomy, in general intended as

textbooks or for use by persons who desired comprehensive rather than detailed information. Much interested in economic questions, Newcomb wrote in this field: *A Critical Examination of our Financial Policy during the Southern Rebellion* (1865); *The A B C of Finance* (1877); *Principles of Political Economy* (1885); *A Plain Man's Talk on the Labor Question* (1886). He also wrote a novel, *His Wisdom the Defender* (1900). Consult his *Reminiscences of an Astronomer* (Boston, 1903) and Marcus Benjamin, in *Leading American Men of Science*, ed. by D. S. Jordan (New York, 1910).

NEWCOMBE, Frederick Charles (1858–). An American botanist. He was born at Flint, Mich., and graduated from the universities of Michigan (S.B., 1890) and Leipzig (Ph.D., 1893). He taught in the Michigan School for the Deaf in 1880–87, and at the University of Michigan he was instructor in botany (1890–92), assistant professor (1893–97), junior professor (1897–1905), and thereafter professor. He was president of the Michigan Academy of Science and of the Botanists of the Central States in 1906.

NEWCOMBE MEMORIAL COLLEGE. See Tulane University.

NEWCOMEN, nū-kŏm′en, Thomas (1663–1729). An English blacksmith, inventor of the atmospheric steam engine, considered the first combination of elements previously known into a true engine. He was born at Dartmouth and, it would seem, had addressed himself to the task of devising a practical engine before 1698, when Savery took out his patent. Possibly Newcomen had forged the larger parts of Savery's engine—they lived only 15 miles apart. But it is certain that Savery shared in the patent taken out by Newcomen about 1710. The part played by John Calley, who was more or less of a partner and assistant, is uncertain; probably he was a grazier who advanced Newcomen money. Newcomen's engine is described and pictured in a copper engraving dated 1719; it was a combination of preceding machines and an improvement on all of them, in that it was a complete change of type, the various elements of boiler, condenser, and engine pump being divided among so many separate parts, which, with the exception of the condenser (the present form of which is due to Watt), are essentially the same as those of the modern engine. Newcomen's was the first practical machine, and it was successfully and commonly used for pumping.

NEWCOMERSTOWN, nū-kŭm′ẽrz-toun. A town in Tuscarawas Co., Ohio, 85 miles east-northeast of Columbus, on the Erie Canal and on the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads (Map: Ohio, H 5). It contains Mulvane's Free Park. The chief industrial establishments are pipe works, a file factory, clay works, and manufactories of brass and bricks. Coal and clay are found in the vicinity. Pop., 1900, 2659; 1910, 2943.

NEWCOMES, nū′komz, The. A novel by W. M. Thackeray (1854–55). The character of Colonel Newcome is one of the finest delineations of a simple-minded, pure-hearted gentleman in fiction, and is said to have been drawn from the author's stepfather, Colonel Smyth.

NEW CONNECTION METHODISTS. See Methodism.

NEW CONNECTION OF GENERAL BAPTISTS. See Baptists.

NEW CORINTH. See Corinth.

NEW CUM′BERLAND. A town and the county seat of Hancock Co., W. Va., 34 miles by rail north of Wheeling, on the Ohio River and on the Pittsburgh, Cincinnati, Chicago, and St. Louis Railroad (Map: West Virginia, D 1). It is chiefly engaged in the manufacture of fire and paving brick, sewer pipe, glassware, foundry and machine-shop products, and tiling, the adjacent region having valuable clay deposits. There are also coal mines and mills for the pulverization of fire clay for use in iron-works. Pop., 1900, 2198; 1910, 1807.

NEW DECATUR, dē-kā′tŭr. A city in Morgan Co., Ala., 81 miles north of Birmingham, on the Tennessee River, just above Decatur, and on the Louisville and Nashville Railroad (Map: Alabama, C 1). It is developing rapidly as an industrial centre, being noteworthy for iron manufactures. There are also important cottonseed-oil and lumber interests, railroad repair shops, and tanneries. New Decatur was settled in 1887 and was incorporated in 1889. Under a revised charter of 1899, the government is vested in a mayor, elected every two years, and a unicameral council. Pop., 1900, 4457; 1910, 6118.

NEWDIGATE, nū′dĭ-gât, Sir Roger, fifth Baronet of Harefield and Arbury (1719–1806). An English patron of art and letters. He was educated at Westminster School and at University College, Oxford, served as a member of Parliament for Middlesex in 1741–47 and for Oxford in 1750–80, and was interested in collieries and in canal building. He made an extensive collection of ancient marbles, casts of statues, and vases. Two marble candelabra, found in Hadrian's Villa at Tivoli, were bought by Newdigate for £1800 and given to the Radcliffe Library, Oxford. In 1806 he established at Oxford the Newdigate prize of 21 guineas to encourage the writing of English verse.

NEW DONGOLA, dŏn′gō-lâ. A town of the Egyptian Sudan. See El Ordeh.

NEWELL, nū′el, Frederick Haynes (1862–). An American hydrographer and irrigation engineer, born at Bradford, Pa. He graduated from Massachusetts Institute of Technology in 1885, and was afterward assistant hydraulic engineer (1888–90) and hydrographer (1890–1902) of the United States Geological Survey, and then served as chief engineer (1902–07) and as director after 1907 of the Reclamation Service. Newell became a member of the Land and Inland Waterways commissions. In 1907 he was president of the Washington Society of Engineers. His publications include: *Hydrography of the Arid Regions* (1891); *Agriculture by Irrigation* (1894); *The Public Lands and Their Water Supply* (1895); *Irrigation in the United States* (1902; rev. ed., 1906); *Hawaii: Its Natural Resources* (1909); *Principles of Irrigation Engineering* (1913).

NEWELL, Peter (Sheaf Hersey) (1862–). An American illustrator and writer, born in McDonough Co., Ill. He worked for a time as photographer and maker of crayon portraits in Jacksonville, Ill., and later studied at the Art Students' League in New York City. Afterward he settled at Leonia, N. J., and contributed constantly to various current publications. His work in flat tones was a later development of his original talent, and became very popular through the ingenious *Topsys and Turveys* (1893–94); *A Shadow Shown* (1896);

Peter Newell's Pictures and Rhymes (1899); *The Hole Book* (1908); *Jungle Jangle* (1909); *The Slant Book* (1910); *The Rocket Book* (1912)—volumes for which he furnished the text himself, and which display a thoroughly original humor and much quaintness of drawing. He also produced the clever and grotesque illustrations for John Kendrick Bangs's *House-Boat on the Styx*, *Pursuit of the House-Boat*, and *Mr. Munchausen;* Lee's *Tommy Toddles;* Stockton's *The Great Stone of Sardis;* Mark Twain's *Innocents Abroad;* and Lewis Carroll's *Alice in Wonderland* and *Through the Looking Glass.*

NEWELL, Robert Henry (1836–1901). An American humorist, born in New York. His reputation was made during the Civil War by newspaper sketches and letters over the name Orpheus C. Kerr (Office Seeker). These letters were collected in four volumes (1862–68). Newell also wrote romances and several volumes of verse. His humor lightened the toil of Lincoln, and it was genuine though not excellent.

NEW ENGLAND. The collective name of the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. It has an area of 67,384 square miles, and had a population, in 1910, of 6,552,681.

Leif Ericson is believed by many to have sailed along the coast of New England as early as 1000 A.D., and it is in New England that the mythical city, Norumbega (q.v.), is generally supposed to have been located. The coast seems to have been visited by Verrazano in 1524, and was to a considerable extent explored by Sir Humphrey Gilbert in 1583, by Gosnold in 1602, by Sir Martin Pring in 1603, and by George Weymouth in 1605. By the charter of 1606 the Plymouth Company was empowered to make settlements in what was then called North Virginia; but an attempt (1607), by a company under George Popham, to found a settlement on what is now the Maine coast, failed. In 1614 Capt. John Smith sailed along the coast, and also went for some distance inland up several of the rivers. He prepared a description of his voyage and a rough map of the coast, and suggested the name New England for the region. Beginning with 1620, when the Plymouth Colony was established in the present Massachusetts, settlers gradually came into New England, and in 1643 the colonies of Connecticut, New Haven, Massachusetts Bay, and Plymouth united to form a confederacy known as the United Colonies of New England, the first attempt at federation made in America. Each colony was to choose two commissioners, and the eight commissioners thus chosen were to hold annual sessions at Boston, Hartford, New Haven, and Plymouth, and were to take action with reference to various matters of common interest to the four colonies. In 1663 the meetings became triennial. Meetings were held as late as 1684, though in the last years little was accomplished. Of the present New England States, Connecticut resulted from the union of the colonies of Connecticut and New Haven, and Massachusetts from the union of the colonies of Massachusetts Bay and Plymouth; while both New Hampshire and Maine were originally under the jurisdiction of Massachusetts, Maine not receiving a separate organization until 1820. See articles on the States and United States.

NEW ENGLAND HISTORIC-GENEALOGICAL SOCIETY, The. An association incorporated in 1845 in Boston, Mass., for historical research in regard to the family histories of the early settlers in New England and the collection of old records. The society began the collection of a library which now contains 40,000 volumes and as many pamphlets, and has also a collection of relics and curios, manuscripts, and many old portraits and oil paintings. It now has a membership of 1000, and holds monthly meetings. In 1847 the society began the publication of a quarterly magazine, the *New England Historical and Genealogical Register,* for circulation among its members, giving the proceedings and necrology of the society, and is now publishing *Vital Records of Massachusetts Towns* to 1850.

NEW ENGLAND ORDER OF PROTECTION. See Protection, New England Order of.

NEW ENGLAND PRIMER, The. One of the most famous schoolbooks in the history of education. Yet it is uncertain when it first appeared, and of the 2,000,000 copies that it is reasonable to suppose were printed and sold in the eighteenth century, less than 50 survive, representing, however, some 40 editions. Much has been done to clear up the bibliography of the work by Paul Leicester Ford in *The New England Primer: A History of its Origin and Development, with a Reprint of the Unique Copy of the Earliest Known Edition, and Many Facsimile Illustrations and Reproductions* (New York, 1897). The compiler of the work was shown by Ford to have been Benjamin Harris, an English printer and rhymester, who during the reign of James II came to Boston. Here some time before 1690 he first issued the *Primer,* an abridgment of another compilation, *The Protestant Tutor.* A fragment of this first edition, or of a second, soon after, was found used as waste in the binding of a book printed in 1688, and is known as "The Bradford Fragment." The *Primer* was changed from time to time to suit not only religious but political feeling. The most familiar quotation from the *New England Primer* is doubtless the nursery prayer, "Now I Lay me Down to Sleep." The *Primer* was "embellished" by crude cuts which have today an exceedingly quaint aspect. The composition of its different editions varies greatly. The earliest is thus made up: (1) Title; (2) Godly Admonitions; (3) Alphabet and Syllabary; (4) Rhymed Alphabet; (5) The Dutiful Child's Promises; (6) An Alphabet of Lessons, Texts of Scripture; (7) Choice Sentences; (8) The Lord's Prayer, Creed, and Ten Commandments; (9) The Duty of Children, Texts; (10) Hortatory Verses; (11) Names in Order of Biblical Books; (12) Roman and Arabic Numerals from 1 to 100; (13) John Rogers' Exhortation to his Children; (14) The Shorter Catechism. Some of the more noteworthy features of other editions are the following: John Cotton's "Spiritual Milk for American Babes," a still shorter catechism, and a "Dialogue between Christ, Youth, and the Devil." A reprint of the *Primer* (Albany, 1899) is easily accessible.

NEW ENGLAND THEOLOGY. The name given to a distinct school of Calvinistic theology, originating in New England, and characterized by modifications of the older theology in respect to the nature of God; the freedom, ability, and responsibility of man; the nature of moral action; and the constitutive principle of virtue.

The school arose in an effort to make of Calvinism "a theology that could be preached," and to ground doctrine upon reason. The originator of the school was Jonathan Edwards (q.v.). With Edwards and his immediate successors the general aim was to combat Arminianism. In 1770 John Murray (q.v.) arrived in New England and began to preach Universalism. (See UNIVERSALISM.) The early decades of the nineteenth century were occupied with the Unitarian controversy and with discussion of the teachings of Dr. Taylor, of New Haven, particularly concerning sin, depravity, and regeneration. The outcome was the adoption of the principles which have since been known as the New England theology, and which may be stated in the propositions that all sin is voluntary; that through the connection with Adam there is in man a sinful propensity which renders it certain that every man will sin from the beginning of moral action; that, though man has complete freedom of will, as a fact, he never turns to God without the previous regenerating operation of the Holy Spirit, which persuasively turns him to repentance and holiness; that holiness is disinterested love; that election is the choice, for reasons lying in the knowledge of God alone, of certain persons, without regard to their own merits, as the recipients of such gracious influence as shall certainly secure their repentance. During the past half century theological thought in New England, as elsewhere, has been profoundly influenced by German philosophy and historical criticism and by the theory of evolution. As a consequence the New England theology as a distinct school has become a thing of the past, and the unmodified doctrines of the older leaders are no longer taught in the Congregational seminaries. Attention has passed from the subjects which this theology considered central. Among those prominent in developing and defending the teachings of the school, after Edwards (1703–58), may be mentioned: Joseph Bellamy (1719–90); Samuel Hopkins (1721–1803); Jonathan Edwards, the Younger (1745–1801); Stephen West (1735–1819); Samuel West (1730–1807); Nathaniel Emmons (1745–1801); Timothy Dwight (1752–1817); Nathaniel W. Taylor (1786–1858); Leonard Woods (1774–1854); Moses Stuart (1780–1852); Edwards A. Park (1808–1900); Henry B. Smith (1815–76); Horace Bushnell (1802–76); Samuel Harris (1814–99). Consult: Williston Walker, *History of the Congregational Churches in the United States* (New York, 1894); G. P. Fisher, *History of Christian Doctrine* (ib., 1896); G. N. Boardman, *History of New England Theology* (ib., 1899); F. H. Foster, *A Genetic History of the New England Theology* (Chicago, 1907). See also CONGREGATIONALISM; and the biographical notices of the leaders.

NEW FOREST. A forest region in the southwestern part of Hampshire, England, with an area of 92,365 acres (Map: England, E 6). It dates from the Norman Conquest, when the district was afforested and protected by severe laws by William the Conqueror. It is a crown possession managed by the Court of Verderers as a public pleasure ground. It is a favorite resort of artists. Consult C. J. Cornish, *The New Forest* (London, 1905).

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